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**TECHNICAL REPORT
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CONVENIENCE FOOD LOGISTICS MODEL (CFLM) DESIGN

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***INFORMATION TECHNOLOGY SOLUTIONS, INC.
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Tables of Contents

List of Figures	v
List of Tables	v
Preface	vii
Summary	1
1. Introduction	2
2. System Components	2
3. Database Management System Design	3
3.1 Primary Data Sources	3
3.1.1 Armed Forces Recipe Service	4
3.1.2 Federal Supply Catalog	4
3.1.3 Ashore and Afloat Test Data	4
3.1.4 Convenience Food Data Sources	5
3.1.5 Data Provided By Mess Specialists and the Food Management Team	5
3.1.6 Ship Data	7
3.1.7 Templates for Creating Menus and Logistical Inquiries	7
3.2 Supporting Tables	7
3.3 Standard Menu Items	8
4. User Interface	8
5. Logistical Requirements - A Rations	9
6. Optimization Algorithm	10
7. Convenience Food Logistics Model Screens	11
7.1 Recipe Screen	12
7.1.1 Ingredients Screen	13
7.2 Convenience Foods Screen	14
7.3 Menu Creation Screen	15
7.4 Logistical Information Screen	16
7.5 Ship Screen	17
7.6 Logistical Inquiry - A_Rations Screen	18
7.7 Logistical Optimization Screen	19
7.8 Price Update Screen	20
8. Model Outputs	21
8.1 Logistical Inquiry Outputs	21
8.1.1 User Input	21
8.1.2 Selected Menu	21
8.1.3 Selected Menu with Labor/Eq/Strg/Cost Req.	21
8.1.4 Logistical Info with List of Requirements	22
8.1.5 Identify Items by Application Logistic Code	22
8.1.6 List of Acquisition Advice Codes	22
8.1.7 List of Usage Management Codes	22

Contents (Cont'd)

8.2	Logistical Optimization Outputs	22
8.2.1	User Input	23
8.2.2	Input A-ration Menu	23
8.2.3	A-Ration Menu with Logistics	23
8.2.4	Optimized Menu with Substitutions	23
8.2.5	Optimized Menu with Logistics	23
8.2.6	Items with List of all Substitutes	24
8.2.7	A-Ration versus Optimized Comparison	24
8.2.8	Equipment Comparison	24
9.	Conclusions	24
10.	Recommendations	25
Appendixes		27
Appendix A - CFLM Programs, Screens, Reports (Files Identified), Testplan		29
Appendix B - CFLM Tables		41
Appendix C - Miscellaneous Menu Items		79
Appendix D - Mathematical Specifications of the Optimization Model		101
Bibliography		112

List of Figures

Figure 1 - Conceptual Model	3
Figure 2 - CFLM Main Screen	11
Figure 3 - Recipe Information Screen	12
Figure 4 - Ingredients Screen	13
Figure 5 - Convenience Foods Screen	14
Figure 6 - Menu Creation Screen	15
Figure 7 - Logistical Information Screen	16
Figure 8 - Ship Information Screen	17
Figure 9 - Logistical Inquiry - A Rations Screen	18
Figure 10 - Logistical Optimization Screen	19
Figure 11 - Price Update Screen	20

List of Tables

Table 1 - Attendance Rates	6
Table 2 - Selection Rates	6
Table 3 - Storage Planning Factors	7

Preface

The Convenience Food Logistics Model (CFLM) and its supporting Database Management Information System (DBMS) were developed by Information Technology Solutions, Inc. (ITS) as a decision support system for the Naval Supply Systems Command (NAVSUP). The project was completed under the direction of US Army Natick Research, Development & Engineering Center from September 1994 until June 1995. The purpose of this effort was to develop a computer-based information system that projects the potential impact of prepared or "convenience" foods on food service aboard 21st century Navy warships.

This report is one of four reports published as a result of the efforts for the Navy Food Service 2000 (NFS2000) project. The purpose of this project was to investigate the impact of using convenience foods in Navy food service. Two of the other reports include the user's manual for the CFLM and an analysis of a Wasp Class LHD ship using the model. The last documents the results of the NFS 2000 project. Their respective titles and Technical Report numbers are:

"Convenience Food Logistics Model - User's Manual," Miller, J. and Evangelos, K., NATICK/TR-96/017; "Logistical Analysis of Convenience Food Substitution in a Typical Navy Menu for a Wasp Class Amphibious Assault Ship (LHD)," Saraf, S., Ph.D., Evangelos, K. And Hill, B., NATICK/TR-96/018; and "Analysis of the Impact of Convenience Foods on Navy Food Service," Evangelos, K., Adams, S., Dr.PH, RD, Short, P. et al., NATICK/TR-96/019.

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CONVENIENCE FOOD LOGISTICS MODEL DESIGN

Summary

In an era of military downsizing, a project was initiated (Navy Food Service 2000) to investigate the impact of using convenience food products in Navy food service systems as a possible solution to future reductions in personnel. One aspect of this project was to determine the logistical impact of substituting menu items prepared using the Armed Forces Recipe Service (AFRS) with similar convenience food items. The Convenience Food Logistics Model (CFLM) is a management tool developed to perform such evaluations. The CFLM is primarily an optimization tool which takes food cost, labor and storage data from databases built into the system, a menu consisting of AFRS recipe items, and user-supplied substitution percentages for various recipe categories to generate an optimal substituted menu. The CFLM also provides reporting capability to determine and compare food costs, labor, storage, and equipment requirements for the input menu and the optimal menu generated by the system.

An analysis was done using the CFLM to validate the system and establish some conclusions about the logistical impact convenience foods may have on the Navy food service operations. The study was conducted using a test menu consisting of AFRS recipe items and an Amphibious Assault Ship (LHD-1) inport. The results showed that the substitution of convenience foods for selected recipes can result in logistical benefits if the substitution strategy is designed and implemented properly. For the ship and menu studied with the current data in the Convenience Food Logistics Model's databases, it was found that main entrees and side dishes offer the greatest potential for achieving logistical benefits through convenience food substitution. In addition, desserts can provide some small benefits in terms of reductions in labor requirements, but with an increase in freezer storage requirements. Substitutions for breakfast entrees, breakfast side dishes, breads and appetizers can only provide limited benefits as a degree of "convenience" substitution already exists in current menus for these recipe categories.

The CFLM can be a useful management tool for evaluating strategies to incorporating convenience foods in current Naval operations. Additionally, it may be suitable to use this tool to plan food service during special missions, or to approximate the storage requirements for future ships.

1. Introduction

The Convenience Food Logistics Model (CFLM) and its supporting Database Management Information System (DBMS) is a decision support system, developed to evaluate the logistical impact of using convenience foods in Navy menus. Convenience foods are defined as packaged frozen, chill, or dry prepared food products such as ready-made lasagna, frozen cookie dough, ready-to-serve pies, etc. The incorporation of convenience foods into Navy menus has been demonstrated as an efficient means of downsizing the scope of food service operations in both ashore and afloat tests conducted by the project team at the US Army Natick Research, Development and Engineering Center (hereafter referred to as Natick). The CFLM does not address the food quality or acceptability of the menus. However, the convenience foods were found to be as acceptable or more acceptable than the meals prepared from scratch or with a mix using the Armed Forces Recipe Service (AFRS) A-Ration items in the two on-site tests. Data collected in these tests, in addition to information from numerous other resources, was used throughout the design and development of the model. This management tool specifically focuses on the areas of storage, labor, equipment and cost.

The CFLM is a user-friendly, stand-alone executable Windows program developed using FoxPro Version 2.6. It incorporates several Navy unique features and includes inquiry and report generation capabilities. Analyses are accomplished by iteratively running logistical inquiries for various ship types, meal attendance and recipe category selection rates. Users can vary the rate of substitution for various 'generic categories' of menu items such as entrees, breakfast items, etc. This flexibility easily simulates different scenarios for determining the effects of convenience food product substitution on labor hours, food costs, and storage requirements.

The structure of the model will be described in this report, as well as the methodology for using a modular design. The capabilities of the system will be outlined, as well as a brief explanation of the process users must follow to operate the CFLM. The appendices provide additional information about the optimization algorithm used and the definition of all the database files contained in the system.

2. System Components

The CFLM utilizes decision rules, an optimization algorithm, a comprehensive DBMS, and the decision maker's own insights to develop new menus composed of both A-Ration items and convenience food products. The decision rules are built into the system to offer a realistic simulation of food service operations aboard Navy ships. The decision rules include such effects as trapping errors made by the user when entering data that forces compliance to these rules and adjusting the portion amounts of convenience food products to equal those found in comparable AFRS menu items. As described later in Section 7, the optimization algorithm is used to process the user entered parameters and preferences to systematically generate optimal menus. One of the most important components of a decision support system is the DBMS. Clean and currently maintained data generates more accurate and effective results. The DBMS is described in the following section. The decision maker's insights are employed both in the criteria entered when making logistical inquiries and in the subsequent actions taken with the information obtained through the use of this model. A diagram illustrating the system components and their

interactions is shown in Figure 1.

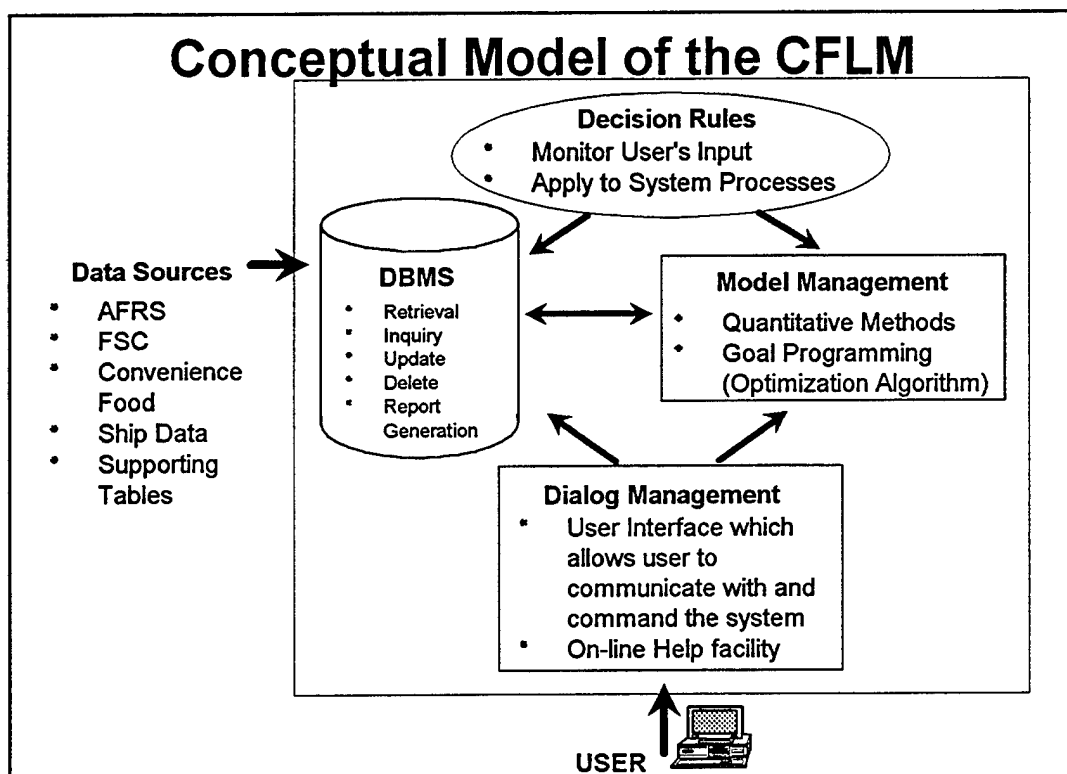


Figure 1 - Conceptual Model

3. Database Management System Design

The DBMS consists of thirty-five (35) database files (tables) which include both primary tables such as those cataloging the AFRS information and supporting tables which are used to facilitate navigation by the end user through the system. Many of the supporting tables are used to display lists from which the user selects to enter data. This reduces the possibility of the user entering invalid data. The DBMS also contains nine view files, each of which are used when a new screen is displayed in the system to show related data. Data may be retrieved, added, deleted, updated and printed out through execution of the compiled program files developed in FoxPro. A matrix identifying the program and report files developed for this application, as well as the test plan used to check the system, is located in Appendix A.

3.1 Primary Data Sources

The DBMS is designed to maintain current information for use by the optimization programs of the CFLM. The following paragraphs cite and describe the data sources used to populate the tables of the CFLM. Appendix B contains a list of tables contained in the DBMS including their structures. The contents of some of the reference tables used in the system are also listed.

3.1.1 Armed Forces Recipe Service

The recipe files were designed and populated using the Naval Supply Systems Command (NAVSUP) Publication 7, Armed Forces Recipe Service (AFRS), REVISION, September 1992. Two tables were created to store the AFRS information. The first table, A_ITEMS.dbf contains a catalog of all the recipes, portion amounts, and the cost, labor, storage, and equipment requirements for one hundred portions. Each recipe item also includes two attributes which are used to associate the recipe item with possible convenience food substitutes. The part of meal during which the recipe is served, Recipe Category (e.g., Breakfast Entree, Dessert), is used as one of these attributes. The second attribute, Product Type, is primarily based on the main ingredient found in the recipe item. For example, meat loaf would be categorized as a main entree (ME) and a ground beef item (BEFG). Product type codes that reflect an ethnic theme in a recipe item are also included and should be used if preserving an ethnic theme in a menu is an important consideration when substituting the item with a convenience food. Chicken Chow Mein, as an example, should be categorized as an Asian item (ASIA) instead of a chicken item (CHKN) to prevent the system from substituting it with a non-Asian item such as chicken fajitas.

The recipe numbers correspond to those found in the AFRS. Those recipes whose numbers begin with 'W' typically refer to commercially purchased items. Recipes whose numbers begin with 'Z' are not part of the official AFRS, but were created by its users and comply with the standards set by the AFRS. Many of the AFRS cards offer variations to selected recipes. These variations are included in the database as separate recipe items, generally designated with a sequential recipe number similar to the original recipe item (e.g. L11900 - Baked Fish, L11901 - Baked Fish with Garlic Butter). Recipes that identify ingredient substitutions within a recipe step, such as 'unsweetened chocolate may be used in place of the cocoa' and '2 TBSP of shortening in step 2', are not included.

The second table used to store the AFRS information, AFRSCARD.dbf, contains data on the ingredients associated with each recipe cataloged in A_ITEMS.dbf. The recipe ingredients are listed in terms of the quantities required to prepare one hundred portions of the recipe item. The units of measure correspond with the units of measure found in the Logistical database which contains the cost, weight, and storage requirements of each item.

3.1.2 Federal Supply Catalog

The Logistical database file was created to store the information contained in the Group 89 Federal Stock Catalog (FSC), dated 1 June 1993, the accompanying Price List, dated 1 October 1994 and NAVSUP Form 1059, dated FY 94 - Third Quarter (1 April - 30 June 94). This data includes the ingredients (their National Stock Numbers (NSN) and descriptions), case weights, storage requirements, units of issue, conversion factors, and any associated acquisition codes.

3.1.3 Ashore and Afloat Test Data

Two on-site tests were conducted by Natick at the Naval Amphibious Base Little Creek, Norfolk, VA and aboard the USS Puget Sound (AD-38). Over one hundred convenience food products were used as substitutes for selected labor intensive AFRS menu items to evaluate the user's

acceptance, and the logistical impact. The resultant data has been incorporated in the CFLM, in the tables storing convenience food product information. Additionally, the labor codes created to categorize the approximate preparation times for convenience foods and some of the A-Ration recipes were generated using this test data.

3.1.4 Convenience Food Data Sources

Product information was collected from various manufacturers and stored in the database file, CONVPROD.dbf. This table contains a system generated item number which is created from a two character manufacturer code and the actual product number. The table also includes the unit prices (based on bulk purchases), case weights and volumes, as well as the cost, labor, storage, and equipment requirements for one hundred portions. One hundred portions was chosen as the amount stored to be compatible with the AFRS items. During the optimization process, these logistical values are considered and used as a basis for calculating larger amounts. The manufacturer's suggested portion size is compared to the portion size for a similar AFRS recipe item. If the portions are different, the servings per case for the convenience food product is adjusted to adhere to AFRS portion amounts. All convenience food products are categorized using the same two attributes found in the recipe database file: Recipe/Meal Category and Product Type codes. Appendix C lists the manufacturers and the date of the product catalogs used for populating this table.

3.1.5 Data Provided By Mess Specialists and the Food Management Team

Site visits were made in December 1994 to the USS South Carolina (CGN-37), USS Bainbridge (CGN-25), and the USS Scott (DDG-995). During these visits, representatives from ITS and Natick interviewed mess specialists aboard the Navy vessels. NAVSUP 1090's were acquired that represented several months worth of menus and exhibited recipe selection and meal attendance patterns. A statistical analysis was performed on this data to develop default values for the attendance rates at each meal (both at sea and in port), as well as for the selection rates for different categories of food items (breakfast entrees, lunch and dinner entrees, desserts, etc.). The results of this study are presented in Table 1. Table 1 depicts the attendance rates used in the CFLM and Table 2 portrays the selection rates for each meal category. Note that fluctuation in attendance due to holidays and paydays was not considered.

Table 1 - Attendance Rates

Attendance Rates		Estimates			Average based
	FMT	USS So. Carol.	USS Scott		on Estimates
Breakfast					
inport	40	20	60		40
inport-WE	30	10	45		28.3
at sea	75	75	70		73.3
Lunch					
inport	70	90	90		83.3
inport-WE	30	25	55		36.7
at sea	90	85	100		91.7
Dinner					
inport	40	30	50		40
inport-WE	30	25	55		36.7
at sea	90	75	55		73.3
Midrats					
at sea	50	50	30		43.3

Table 2 - Selection Rates

Category	Default Value (Average)
Appetizer (AP)	51.8 %
Breakfast Entrees (BE)	57.1 %
Breads (BR)	80.0 %
Breakfast Side Items (BS)	47.8 %
Beverage (BV)	64.6 %
Dessert (DS)	70.9 %
Entree (EN)	62.7 %
Miscellaneous (MS)	25.0%
Sauces (SC)	49.6 %
Side Items (SI)	71.2 %
Salad Bar	75.6 %

The personnel from the Navy Food Management Team (FMT) in Norfolk, VA also supplied information that was used to develop standard labor codes and associated preparation times by which to categorize AFRS menu items. The labor rates, both for the A-Ration items and the convenience food products, are based on generic preparation methods (e.g. baked goods prepared from scratch vs from a mix for an A-Ration item and thaw and serve for a convenience food product.) The preparation times associated with the labor codes are defined at three levels: 100, 200, and 500 portion amounts. Labor can not be defined as a simple linear function as when one doubles the number of portions prepared, the preparation time does not double. However, it was decided to simulate labor using a piecewise linear function with three breakpoints (100, 200 and 500 portions) as a baseline. Labor for varying portion amounts is defined as a linear function connecting the adjacent breakpoints. A complete list of the labor codes and associated

preparation times used for A-Ration items and convenience foods can be found in Appendix B.

3.1.6 Ship Data

The reference, Jane's Fighting Ships, was one resource used to populate the table storing US Navy Ship information. Additional data was obtained from the Naval Sea Systems Command (NAVSEA SYSCOM), to include the planning factors used to calculate available dry, chilled, and freezer storage space aboard Navy vessels. Table 3 contains a list of these planning factors. Note that although the available storage is based on 45 days for dry and freezer space and 30 days for chilled, the CFLM is designed to accept menu cycles of less than or equal to 35 days. Users must consider the ship's actual replenishment rate when comparing the results of their logistical inquiries.

Table 3 - Storage Planning Factors

Storage Type	Planning Factor/Person (cu ft)	Replenishment Cycle
Dry	.0867	45 days
Chill	.0547	30 days
Freezer	.0357	45 days

Information for approximately sixty-two US Navy Ships is currently stored in the CFLM database file, SHIPS.dbf. At least one ship in each classification was entered to initially populate the database.

3.1.7 Templates for Creating Menus and Logistical Inquiries

Menu creation and logistical inquiries are done using templates. The templates are blank database files that are set up to accept data in a standard format either for a new menu (using PROTOMEN.dbf) or a new logistical inquiry (LOG_INQ.dbf). Menus created using the CFLM can be printed out and saved to a file. The system is designed to use the default directory, C:\CFLM\MENUS, to save menu files and C:\CFLM\LOGS to save logistical inquiries, but the user can save these files to other directories or drives. However, logistical inquiries or modifications to menu files can only be conducted using menu files created with the CFLM or structured similarly.

3.2 Supporting Tables

The CFLM consists of several key supporting tables. The table that drives the menu generating program, CFLMMENU.prg, is MENU.dbf. This table is referred to in CFLMMENU.prg which sets up the menu options displayed throughout the application. The table, ERRORS.dbf contains all the error and information messages found in the CFLM. This table is referred to when the system encounters an error or when information is to be displayed. The structure and contents of these tables can be found in Appendix B.

The table, SUBITEM.dbf is used to associate AFRS recipes with possible convenience food products. The only information stored in this table is the recipe number and the associated convenience food item numbers. This table is updated by the system as new products/recipes are added, or when existing products/recipes are re-categorized, in terms of their meal categories or product types.

3.3 Standard Menu Items

There are many items in a Navy menu for which there exist no convenience food substitute. Many ships offer a speedline, which typically consists of fast food items such as hamburgers, frankfurters, french fries, etc. It would not be suitable to consider substituting Speedline, as well as Salad Bar menu items with convenience food products. There are also many miscellaneous menu items such as ketchup, soy sauce, salt and pepper, and beverages that have no convenience food substitutes. Therefore, these items should be excluded from the menus processed in the CFLM. However, users should consider the logistical requirements associated with these items when comparing logistical results.

In order to display realistic cost and storage requirements associated with a ship and a selected menu, standard items such as the Salad Bar, Speedline, and Miscellaneous items are accounted for in the user's input report which is accessible from the *Logistical Inquiry* and *Logistical Optimization* screens. This report displays the criteria entered by the user prior to calculating the menu's logistical requirements or generating an optimal menu with convenience food substitutes. It also displays information about the ship selected, as well as the A-Ration menu used. The approximate logistical requirements for these standard menu items are given.

Three standard menus were created to account for these standard items. The logistical requirements for these menu items were calculated for a one week menu cycle, simulated separately for at sea and inport scenarios. Each scenario used a complement size of one hundred and the default values for the meal attendance and recipe category selection rates. The cost and storage associated with these generic menus are scaled to reflect the ship's status (e.g. at sea or inport) and the total number of customers to consider, which is based on the user's response to data fields in the *Logistical Inquiry Screen*. Appendix C contains a list of the items included in these three standard menus. This data is hard-coded in the system and the logistical values used can not be updated or modified by the user. As food costs increase, one should consider that the costs associated with these menus would have also increased. One method to assess the change would be to create a new menu file consisting of the same items or items which better reflect the current usage for one or all of the standard menus. The user can then process the menu through the *Logistical Inquiry Screen* to identify the current logistical requirements. The items identified in these standard menus can be viewed or printed from the *Menu Creation Screen*. The contents of these reports cannot be modified by the user. They are provided for information only.

4. User Interface

The CFLM has a menu-driven interface which allows the user to view, add, delete, or update information in the AFRS recipe card database, convenience food database, logistical information

file, ship information file, and other tables found in the model. The model provides options to create new menus and to change existing menus. The system is user-friendly and designed to facilitate data entry and prevent the user from inadvertently corrupting existing data.

There are options to perform logistical inquiries using the A-ration recipes exclusively, or invoking the optimization model to develop a new menu of A-ration recipes and convenience food products from an existing menu of A-ration items. The latter option is the focus of the CFLM. The system provides food service managers with a tool for projecting the impact of using convenience food products on board Navy ships.

An on-line help system assists the user in navigating through model screens. The help system displays instructions for using each of the screens. To access this information, user selects 'Help' from the menu options shown at the top of each screen. Context sensitive help may be accessed by pressing the F1 key on the keyboard. Instructions on using the active screen will be displayed.

5. Logistical Requirements - A Rations

CFLM provides an option to compute logistical requirements (i.e., cost, labor, dry, chilled and freezer storage) for a given menu cycle. The computations for the menu cycle are performed using the cost, storage per hundred portions and number of portions to be prepared. Thus, computing logistical requirements for the complete menu cycle consists of three different steps: computing of logistical requirements per hundred portions, computing number of portions to be prepared for each menu item and aggregating the logistical requirements for the complete cycle. The following paragraphs will describe these steps.

The cost and storage requirements per hundred portions are calculated using the information on the AFRSCARD.dbf file which specifies the quantities of various ingredients needed to prepare one hundred portions of a specific recipe item. These quantities required are multiplied by storage and cost information for ingredients from the LOGFILE.dbf table to compute the logistical requirements for each ingredient. The ingredient level logistical requirements are aggregated to yield requirements for one hundred portions of the recipe item. The labor requirements are entered by the user for 100, 200 and 500 portions of the recipe items upon selecting a type of labor preparation.

The number of portions to be prepared are primarily dependent on the number of customers to be served by the General Mess. This number is obtained by identifying the number of enlisted personnel allocated to the selected ship. If separate messes are unavailable, the Chief Petty Officers (CPO) and officers are included. This total number of customers is then multiplied by attendance and selection percentages to arrive at the portions to be prepared for each recipe item. For example, if the number of customers to be served by the General Mess is 200 and a particular menu item is served in a meal where the attendance rate is 50% and only 75% are estimated to select the menu item, 75 portions would be prepared, as shown below:

$$\text{no. of portions} = 200 * .50 * .75 = 75$$

The labor required is obtained by using a linear extrapolation between the adjacent breakpoints (100, 200 or 500). For example, if a menu item required 100 minutes to prepare 200 portions and 160 minutes to prepare 500 portions then 275 portions will require 115 minutes or 1.9 hours.

$$\begin{aligned}\text{labor required} &= \{(100 + (160-100))/(500-200)\}*(275-200) \\ &= 100 + 60/300*75 \\ &= 115 \text{ minutes}\end{aligned}$$

The logistical requirements for individual recipe items are then aggregated to generate the logistical requirements for the complete menu cycle.

When cost and storage data are calculated for menu items--particularly with convenience foods--it is assumed that the required number of portions may be purchased in that exact quantity. For example, a convenience food product may be sold in quantities of 48 portions/case. If a menu requires 50 portions, the calculations for cost/storage, etc. will be performed for one case and the remaining percentage of a second. In reality, two cases will need to be purchased. Due to this assumption, if a ship's complement is large the model results provide a good approximation of reality. However, for smaller ships the results should be interpreted with care.

6. Optimization Algorithm

The optimization algorithm in the CFLM is used to generate a combination menu (consisting of A-ration items and convenience substitutes) to minimize a user-specified objective and achieve the user-specified substitution percentages for various recipe categories. In particular, the optimization algorithm takes a user-specified menu file as input and substitutes some of the menu items with those convenience food substitutes which best satisfy the minimization objective, until the required substitution rates are met for each category. The cost, labor hours, storage and equipment required for the substituted menu, as well as the original A-ration menu, are displayed to the user. The user can simulate cost, labor, dry, chilled or freezer storage minimization objectives. In addition, the capability to simulate a weighted objective function by weighting the above five objectives is also provided. The weighting of objectives is provided so that a multi-objective optimization can be modeled. Thus, if the goals of the decision maker are multi-faceted (for example, both minimizing food costs and freezer storage requirements are a priority), subjective weights/importance may be assigned to the individual objectives.

The substitution rates are provided to study the impacts of the degree of "convenience" substitution for each individual recipe category. For example, if a menu has 100 main entrees and the user specifies 20% substitution rate for main entrees, the model will only consider menus which have convenience food items substituted for 20 of the main entrees. The decision variables of the optimization problem refer to determining which recipe items to substitute by convenience products. Also, if some recipe items have multiple possible substitutes, the model also identifies the substitute that would best meet the user's objective.

When the user enters the *Logistical Optimization Screen* of the CFLM, the user must first enter a menu file and a ship type to be used in the simulation. The ship type selected automatically

populates the complement size (enlisted personnel only) for the ship. Next, the user selects whether he wants to run the optimization for an "inport" or "at-sea" scenario. Based on this selection, default values of attendance rates are displayed. These defaults can be modified by the user. Next, the user selects the objectives he wants to simulate. For each of the objectives, the user can also specify a level of importance ("weight") on a scale of 0 to 10. The user must weight at least one of the objectives.

Based on these input parameters, the CFLM first computes portions to be prepared for each menu item. The computations of portions is based on the number of customers, selection and attendance rates (as described before). Next, a list of substitutes for each menu item is generated. The objective function value is computed for each substitute and the best substitute from the list is kept. For example, if cost minimization is being simulated, the least costing convenience substitute is kept from the list of substitutes for each menu item. The model then computes the differences in objective function values for A-ration items and their substitutes. The list of substitutes is then sorted by descending reductions in objective function values, thus the menu item which when substituted by convenience item causes the largest reduction in objective value is the first in the sorted list. The items are selected from this sorted list until the desired substitution rate is achieved. A detailed discussion of the mathematical specifications of the optimization model can be found in Appendix E.

7. Convenience Food Logistics Model Screens

The CFLM contains nine screens in which database maintenance operations can be conducted, or logistical calculations/optimizations can be performed. The main screen through which all others are accessed by selecting from the main menu options is shown in Figure 2. The following sections will briefly describe each of the screens found in the system.

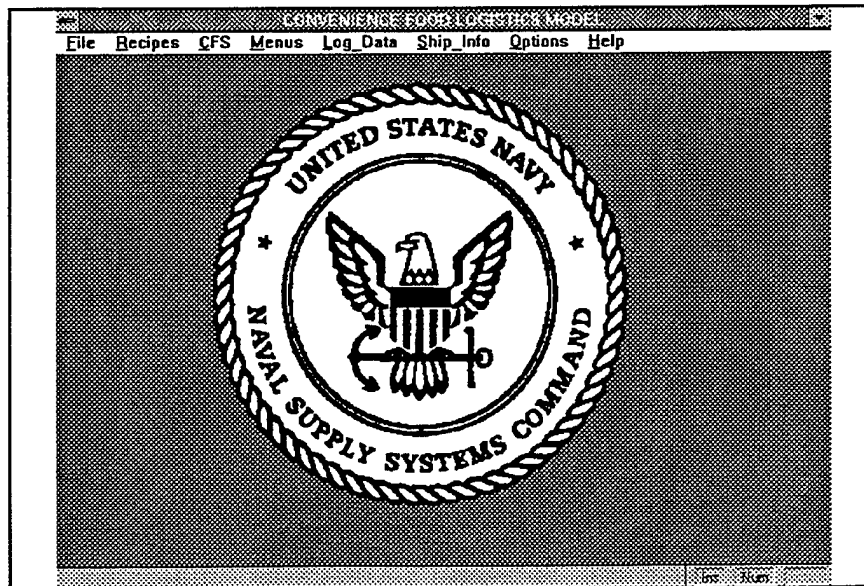


Figure 2 - Main Screen

7.1 Recipe Screen

The *Recipe Information Screen* allows the user to perform functions such as add, delete and search for recipes in the AFRS database. The cost and storage requirements for one hundred portions of each recipe based on the ingredients used can be generated from the *Recipe Information Screen*. The convenience food substitution list is also updated from this screen. To access the *Recipe Information Screen* menu selections, the user will select the Recipe menu item in the CFLM Main Application Screen menu bar. The screen displayed is shown in Figure 3.

The screenshot shows a software window titled "CONCEPT 2000 LOGISTICS MODEL" with a menu bar (File, Print, Help) and a sub-header "ARMED FORCE RECIPE SERVICE". The main area is titled "RECIPE INFORMATION".

Fields and buttons include:

- Recipe Number:
- Name of Recipe:
- Recipe Size:
- Select Recipe Category:
- Select Product Type:
- Buttons: "Browse Existing Recipes", "Ingredients"
- Section: "# Items Required for 100 Portions" with a value of "0.00".
- Section: "Other Equipment Required" with checkboxes for "Fryer", "Kettle", "Smoker", and "Mixer".
- Section: "Select Std. Labor Type" with a value of "WEAVING MORE PREP REC".
- Section: "Preparation Time (min)" with a value of "100".
- Section: "100 Portions: 200 Portions: 500 Portions:" with values "100", "200", and "500" respectively.
- Buttons: "Estimate Search", "Save", "Exit"
- Section: "Calculate Cost/100" with a value of "249.50".
- Section: "Data Cost Was Calculated" with a value of "0.00".
- Buttons: "Generate Substitution List", "Display Convenience Food Substitutions"
- Section: "Data Substitution List Was Generated" with a value of "05/20/95".

At the bottom, there is a status bar with "Action: Recipe: REC20112" and "End: Main".

Figure 3 - Recipe Information Screen

Buttons are provided on this screen for selecting recipe category and product types. Based on these choices the existing recipes falling in these categories in the database can be browsed. Labor type code and equipment required for a recipe is assigned from this screen. The screen also has buttons for developing/displaying substitutions for a given recipe and for calculating cost and storage requirements per 100 portions of the recipe. Options to print/view recipe and related information are available from this screen.

The ingredients button on the screen is used to open a sub-screen showing ingredients for the recipe. From this sub-screen, ingredients can be added or deleted for the selected recipe.

7.1.1 Ingredients Screen

The *Ingredients Screen*, a subsystem of the *Recipe Information Screen*, allows the user to view a list of the ingredients required for the selected recipe. Ingredients may be added, changed or deleted from this screen. Note that any ingredient modifications made to this database alters this military document. The user is encouraged to make such changes by entering a new recipe and identifying it with a recipe number beginning with the letter 'Z.' The *Ingredients Screen* displayed when the Ingredients button is clicked from the *Recipe Information Screen* is shown in Figure 4.

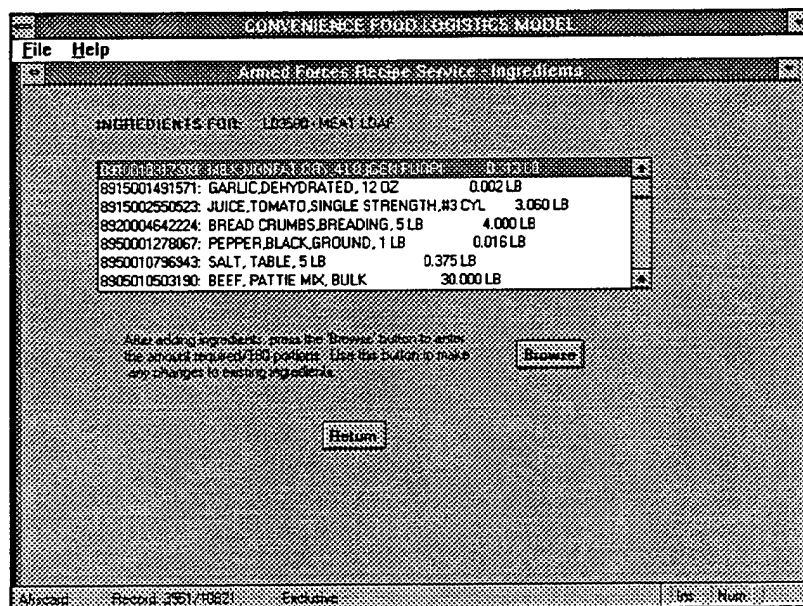


Figure 4 - Ingredients Screen

7.2 Convenience Foods Screen

The *Convenience Foods Screen* allows the user to perform functions such as add, delete and search for convenience food products. The information stored in the convenience food product database file is also used to associate A-Ration recipe items with similar convenience food products. The user selects a product category by using the Category button from this screen. Manufacturers in the database are provided in a drop-down list and the user can select from the list. The CFLM convenience food item number is generated by concatenating the two character abbreviation for manufacturer and manufacturer's product code which is entered by the user.

The user can also assign the type of storage and equipment required and select a labor type code for convenience items on this screen. Product attributes like cost, volume, type of storage required, gross and net weight are also assigned through this screen. The screen provides a button for computing cost and storage required for 100 portions of the product. The manufacturer's suggested portion size is adjusted to reflect AFRS portion size prior to computing cost and storage per 100 portions. Options to print/view convenience food information are available from this screen. The screen is shown in figure 5.

The screenshot displays the 'CONVENIENCE FOOD LOGISTICS MODEL' window. It features a menu bar with 'File', 'Print', and 'Help'. The main area is titled 'Convenience Foods' and contains several sections for data entry and calculation. On the left, there are fields for 'Category' (ENTREE), 'Manufacturer' (STOUTERS), and a section for 'Enter New Manufacturer Below' with a 'Prefix for New Item Number' field. Below this is 'Product Type' (BEEF - GROUND BEEF ITEM), 'Enter Manufacturer's Product Code', and 'Product Name' (MEATLOAF IN GRAVY). A section for '# Ovens Required to Prepare 100 Portions' shows '0.20'. There are checkboxes for 'Other Equipment Required' (Type, Steam Kettle, Biddle, Man). A 'Select Std. Labor Type' dropdown is set to 'HEAT AND TRANSFER'. Below this are 'Preparation Time (min)' fields for 100, 200, and 500 portions, with values 15, 20, and 60 respectively. A 'Comments' field contains '1'. At the bottom left are buttons for 'Execute Search', 'Save', and 'Exit'. On the right, the 'Item Number' is 'ST03002917'. A 'Portion Size (Amt/Person)' section shows 'Mfr's Suggested' as 4.00 and 'AFRS Portion' as 6.00. Below this are fields for 'Servings/Case' (58), 'Case Pack' (4/58), 'Case Weight' (16.11), 'Net Wt.' (14.50), 'Gross (lb)' (16.11), 'Case Vol (cu ft)' (0.52), and 'Cost/Case' (\$31.15). A 'Storage Type' dropdown is set to 'Freezer'. A 'Calculate Req./100' button shows '180.26'. Below this are 'Storage (cu ft)/100 Portions' (1.50) and 'Date Cost & Storage /100 was Calculated' (05/18/95). At the very bottom, a status bar shows 'Completed', 'Record 57/345', 'Exclusive', and fields for 'Line' and 'Num'.

Figure 5 - Convenience Foods Screen

7.3 Menu Creation Screen

The *Menu Creation Screen* allows the user to create new menus, select and modify existing menus, and delete selected menus from the CFLM DBMS. In working with this screen the user can select any menu file with the same structure as the *Menu Creation Screen* (i.e., as created using the *Menu Creation Screen*). The default directory is 'C:\cflm\MENUS\.' However, if the desired menu file is in a different directory or on a different drive, the user can access it by entering the information in the Open dialog box. This dialog box is displayed after the Select Menu option is chosen from the File menu item in the menu bar. Once the menu is selected, the menu filename datafield, located at the top of the *Menu Creation Screen*, is filled in with the menu name and directory. This field becomes blank when the menu is closed. An illustration of this screen is shown in Figure 6.

The screenshot shows a window titled 'CONVENIENCE FOOD LOGISTICS MODEL' with a menu bar containing 'File', 'Print', and 'Help'. Below the menu bar is a sub-header 'MENU CREATION SCREEN'. The main area contains several input fields and buttons. At the top, 'Menu File Name' is followed by a text box containing 'C:\CFLM\MENUS\TESTMENU.DBF'. Below this is a section for 'Day (Indicate # of day within the Menu Period):' with a spinner box set to '1' and the label 'BREAKFAST'. A 'Select Meal' button is next to it. Below that, 'Recipe Selected:' is followed by a text box containing 'DQ2200 FRENCH TOAST'. Underneath is 'Selection Rate (%)' with a spinner box set to '57.1'. On the left side, there are three buttons: 'Add Recipe', 'Select Recipe', and 'Delete Recipe'. Below these are four more buttons: 'View Menu', 'Save Menu', 'Close Menu', and 'Exit'. At the bottom right, there is a note: 'If Creating A New Menu, Enter File Name Below. Note: Filenames must be < 8 characters in length.' followed by an empty text box. The status bar at the bottom left says '93 records added' and the bottom right has 'File' and 'Name' labels.

Figure 6 - Menu Creation Screen

The user can add a recipe record to the menu file using the Add Recipe command button. The Select Recipe command button can be used to select or change the recipes in the open menu file. The default selection rate for each menu item is displayed for each menu item shown which can be overridden, if desired. The Delete recipe command button is used for deleting a recipe from the menu. Options to print/view the currently selected menu or one of the three standard menus are also provided.

7.4 Logistical Information Screen

The *Logistical Information Screen* allows the user to update the logistical database file containing the food products (ingredients) available through the Group 89 Federal Stock Catalog (FSC). Any items added or deleted from this screen may affect AFRS recipes previously entered. After completing the *Logistical Information Screen* it may be necessary to return to the *Recipe Information Screen* and make the appropriate changes (i.e., add new ingredient to an existing recipe, find a substitute ingredient for a deleted ingredient, etc.).

This screen provides buttons to choose storage type, acquisition and usage management codes for the selected ingredient. In addition, several logistical fields such as gross weight, net weight, volume, case dimensions, units per case and cases per pallet are populated through this screen. New ingredients can be added or existing ingredients can be browsed or deleted. The screen also provides an option to browse all recipes which use a given ingredient. This should help in updating relevant calculated fields on the *Recipe Information Screen* when logistical information of an ingredient is changed. Options for viewing and printing logistical information are also provided. The *Logistical Information Screen* is shown in Figure 7.

CONVENIENCE FOOD LOGISTICS MODEL

File Print Help

Logistical Information

NSN: 55700517308 Navy Code: GSI

Description: Canned Corned Beef

Storage: Canned

Check: ☐ Perishable ☐ Semi-Perishable

Fiscal Year: 01 Fiscal Year: 01 Unit Price: 0.77

Price: 0.77 Price: 0.77

Acq. Advice Code: H Action Code: L

Usage Mgmt Codes: 0

Index No: 150

Case Lot Data

Gross Wt	50
Net Wt	50
Vol (cu ft)	1.85
Length	32.0
Width	17.5
Height	4.5
Package Unit	1
Unit/Case	0
Cases/Pallet	0
Units Based by	BC
Conversion Factor	1.000

Browse Existing Items Execute Search

Recipes Save Exit

Log No: Revised 150/1517 Exclusive

Figure 7 - Logistical Information Screen

7.5 Ship Screen

The *Ship Information Screen* allows the user to enter all pertinent ship information on ship classification, ship type and class of ship. The ship's complement, mess information, galley equipment, and total available storage data for the general mess are used to compare the results of logistical calculations for selected A-Ration menus with the actual ship attributes. The Classification, Type, and Class of Ship Command buttons allows the user to view/select different Ship classifications and types. The Browse button, as well as the File Search Menu option, can be used to locate existing ships. The screen in view upon selecting Ship_Info from the main menu options is shown in Figure 8.

General Mess Quality	
Dinner	11.50
Breakfast	12.50
Lunch	13.50
Snacks	14.50
Misc.	15.50

Figure 8 - Ship Information Screen

7.6 Logistical Inquiry - A-Rations Screen

The *Logistical Inquiry - A-Rations Screen* allows the user to compute and view logistical information associated with specific ships for selected menus. The process primarily involves calculating the number of portions needed and aggregating the logistical requirements for the complete menu cycle. Two buttons are provided for selecting a menu file and a ship. The selection of the ship causes the default complement size (number of enlisted personnel) to be displayed. Based on user selection as to whether separate messes are available, the model computes the total number of customers. Depending on whether an inport or at-sea scenario is simulated, default values of attendance rates are also displayed. These values can be changed if desired. When the Calculate Logistics button is clicked, logistics are computed and the user has the choice to view/print the results through a series of output options. Section 8 provides more detail on these options. The *Logistical Inquiry - A-Rations Screen* is shown in Figure 9.

The screenshot shows a software window titled "CONVENIENCE FOOD LOGISTICS MODEL" with a menu bar (File, Inquiry, Reports, Help) and a title bar (Logistical Inquiry - A-Rations). The interface includes several input fields and buttons:

- Select Menu:** A button and an adjacent text input field.
- Select Ship:** A button and an adjacent text input field.
- Hull No.:** A text input field.
- Ship's Complement:** A text input field with the value "0" displayed.
- Attendance Rates:** A table with two columns: the meal type and the attendance rate (all currently "00").

Attendance Rates	
Breakfast	00
Lunch	00
Dinner	00
Mid-Rations	00
Weekend Rations	00
- Subsist From The Shoreline:** A text input field with the value "0.0" and the label "(If Available)".
- Visit The Sated Bar:** A text input field with the value "0.0" and the label "(If Available)".
- All Rations Subsist From The General Mess (Y or N):** A checkbox.
- Ship is at Sea (Y or N):** A checkbox.
- Instructions:** A text box stating "User Input and Logistical Calculations Can Be Saved. Enter File Names Below After Logistics Have Been Calculated!".
- Output Options:** Three text input fields labeled "User Input:", "Logistical Data (Ingredients):", and "Daily Menu w/Requirements:".
- Buttons:** "Calculate Logistics", "Clear Menu", and "Exit".
- Status Bar:** Displays "0 records copied" and "File: Run".

Figure 9 - Logistical Inquiry - A-Rations Screen

7.7 Logistical Optimization Screen

The *Logistical Optimization Screen* allows the user to view logistical information associated with specific ships for selected A-Rations menus. It also allows the user to compare this logistical information with that of a newly generated menu containing convenience food substitutes. This substitution menu is optimized based on user selected objectives. The substitution rates and weights of the objective functions (i.e., minimize cost, labor, etc.) control the results of the optimization. The first part of this screen is almost identical to the one for the *Logistical Inquiry-A-Rations Screen*. The user selects menu and ship which displays the enlisted complement size. User can select inport or at-sea scenarios. The default attendance rates can be overridden as before. In this screen, options for setting the substitution rates by categories and weights for various objective functions are also available. This screen is illustrated in Figure 10.

The screenshot shows a software window titled "CONVENIENCE FOOD LOGISTICS MODEL" with a menu bar (File, Inquiry, Reports, Help) and a title bar (Logistical Optimization). The interface includes the following elements:

- Select Menu:** A text input field.
- Select Ship:** A text input field.
- Ship's Complement (Enlisted Only):** A text input field with the value "0".
- Enter the % of the Total # of Customers Who Substituted From The Spreadsheet:** A text input field with the value "0.0".
- Must Use Subst Bar:** A text input field with the value "0.0".
- All Rations Substituted From Menu: Minus (Y/N):** A text input field.
- Hull No.:** A text input field.
- Ship is at Sea (Y/N):** A text input field.
- Attendance Rates:** A table with two columns: Category and Rate.

Breakfast	0.0
Lunch	0.0
Dinner	0.0
Mid-Ration	0.0
Weekend Rations	0.0
Breakfast	0.0
Lunch	0.0
Dinner	0.0
Mid-Ration	0.0
- Substitution Percentages:** A table with two columns: Category and Percentage.

Appetizers	0.0
Breakfast Entrees	0.0
Breakfast Side Dishes	0.0
Breads	0.0
Entrees	0.0
Side Dishes	0.0
Desserts	0.0
- Importance/Weight:** A table with two columns: Category and Weight.

Minimize Costs	0.0
Minimize Labor Hours	0.0
Minimize Chilled Storage	0.0
Minimize Dry Storage	0.0
Minimize Freezer Storage	0.0
- Buttons:** "Generate Substituted Menu", "Close Menu", and "Exit".
- Footer:** "0 records loaded" and "File Name for Substituted Menu" and "File Name for Logistical Comparison Data".

Figure 10 - Logistical Optimization Screen

When the Generate Substituted Menu command button is clicked, the optimization program generates the optimized combination menu. The generated menu can be saved as well as several options to print/view results are available. If a problem is found to be infeasible, the category for which the substitution rate constraint could not be fulfilled is identified. The user is then prompted to reduce the substitution rate for that category and run the process again.

7.8 Price Update Screen

The *Price Update Screen* allows the user to automatically update the ingredient prices and recipe costs for recipes entered in the CFLM DBMS. This option should be used with caution as it could corrupt the Logistics File and cost information in the Recipe File if done improperly. The price data update refers to the cost of the items found in the NAVSUP 7330. The default values of the data fields in this screen are the names of the data file and fields used by NAVSUP to maintain price information. Similar to other screens in the system, these default values may be overridden by the user. The *Price Update Screen* is shown in Figure 11.

All data necessary to identify the location and name of the updating file to be used in this process must first be entered by the user. The user must also indicate the fiscal month/year and the price month/year of the updating price information. Once accepted by the system, and the updating file is opened, the user can click the Update Prices button. This activates the process by which the items in the update file are located in Log_File.dbf and their prices replaced with the current data. It is very important that any new items must first be entered into the CFLM DBMS. The user can identify any items which were not updated by opening the table, Log_file.dbf in FoxPro and performing a search on those items with a different fiscal or price month/year. Once identified, the user can determine whether these items have been removed from the supply system or whether another type of change in acquisition occurred.

The search routines in the CFLM were designed such that the first record in the table being searched has been reserved for user-entered search criteria. It is marked as deleted, recalled during the search routines, and then re-marked deleted. Therefore, it is essential that if any database maintenance is performed outside the system, (i.e. as just described with the table, Log_file.dbf using FoxPro), caution should be taken not to pack the table until the first record is recalled. This record should then be deleted before being copied back to the \TABLES directory. Packing a table will permanently remove deleted records from the database file and renumber the records. If the first record is removed, the system will use the new 'first record' which would overwrite a valid record, thus destroying data integrity.

File Help

LOG_FILE.DBF PRICE UPDATE

Enter the following information to identify where the file containing the current prices are located:

Drive: Path: Filename: Field: File: Selected:

Enter the current fiscal month/year and the actual price month/year associated with the current information:

Fiscal: Month: Year: Price: Month: Year:

Update Prices Update Recipe Costs Choose File Exit

Log File Record: 3271312 Database File: 0.000

Figure 11 - Price Update Screen

8. Model Outputs

Recipe, convenience food, and ship information, as well as logistical data associated with a specific ingredient can be printed out from their respective screens in the CFLM. The Menu Creation screen provides options to view/print the currently selected menu, or one of the three standard menus: Salad Bar, Speedline, or Miscellaneous Menu Items.

Summary reports, as well as more detailed reports, are available from both the *Logistical Inquiry-A-Ration Screen* (using only A-Ration recipes in a selected menu) and the *Logistical Optimization Screen* (used for running the optimization algorithm). The user may also print out the selected menu and save all available reports to a file. The reports provided as a result of optimization runs are designed to allow comparison of cost, labor, storage and equipment requirements in relation to the input A-ration menu. The next few subsections provide more details on the reports provided in the *Logistical Inquiry* and *Logistical Optimization* screens.

8.1 Logistical Inquiry Outputs

The Report menu options allow the user to preview and/or print selected information derived from the *Logistical Inquiry Screen*. The user has the option to view the reports on the screen and/or on paper. A report may be re-selected as often as desired. However, once a new inquiry is entered or the user leaves this screen, the information is lost unless the report was printed or the data saved to a file. To retrieve this data at a later time, a commercial database or spreadsheet software program must be used. To view the information, the user will select the Report menu item from the menu bar, select the desired report, and click on the appropriate radio button in the Report Generation dialog box. Selecting Preview sends the report to the Page Preview Screen; Print sends the report to the printer. The *Logistical Inquiry A-Rations Screen* Reports are described below:

8.1.1 User Input

The Print User Input Report option provides the user with a report that displays all data entered to generate the new inquiry. This report will display the ship information which can then be compared to the selected menu's requirements (i.e., freezer storage).

8.1.2 Selected Menu

The Print Selected Menu Report option provides the user with a report that displays each recipe entered by Day, Meal, Recipe No., and Item Name for the selected menu.

8.1.3 Selected Menu with Labor/Eq/Strg/Cost Req.

This option provides the user with a report that displays the Number of Portions, Cost(\$), Storage Required per cubic foot (Dry, Chilled, Freezer), Labor Hours, Number of Ovens, and any other equipment required for individual recipes in the selected menu. Daily Totals for Cost (\$), Labor Hours, and Number of Ovens are provided as well as Totals for Menu Cycle for Cost(\$), and Storage Requirements.

8.1.4 Logistical Info with List of Requirements

This report option provides the user with a report that displays a summary of storage space requirements in cubic feet and ingredient costs broken out by the three different types of storage (Dry, Chilled, Frozen). The storage amounts are displayed by the Required Amount (based on the actual ingredients used) and the Minimum Amount (based on the minimum number of cases required). The Total Cost for the selected menu is also provided.

8.1.5 Identify Items by Application Logistic Code

This option provides the user with a report that lists the National Stock Number (NSN), Ingredient Name, Usage Management Code (when available), and the Acquisition Advice Code. If there are ingredients identified in this report which should not be used (i.e., Terminal Item) the user can go to the *Logistical Information Screen* to use the Print List of Recipes with this Ingredient Print option to list affected recipes.

8.1.6 List of Acquisition Advice Codes

This Report option provides the user with a list of Acquisition Advice Codes and Descriptions. The Acquisition Advice Codes are provided for NSN items in the Identify Items by Application Logistical Codes Report option described above.

8.1.7 List of Usage Management Codes

The Print List of Usage Management Codes Report option provides the user with a list of Usage Management Codes and Descriptions. The Usage Management Codes are provided for NSN items in the Identify Items by Application Logistical Codes Report option described above.

8.2 Logistical Optimization Outputs

The Report menu options allow the user to preview and/or print selected information derived from the *Logistical Optimization Screen*. The user has the option to view the reports on the screen and/or on paper. A report may be re-selected as often as desired. However, once a new inquiry is entered or the user leaves this screen, the information is lost unless the report was printed or the data saved to a file (same as described in section 8.1). To view the information the user will select the Report menu item from the menu bar, select the desired report, and click on the appropriate radio button in the Report Generation dialog box. Selecting Preview sends the report to the Page Preview Screen; Print sends the report to the printer. The *Logistical Optimization Screen* reports are described below:

8.2.1 User Input

The Print User Input Report option provides the user with a report that displays all data entered to generate the new inquiry, information associated with the ship selected, and the estimated logistical requirements for the standard menu items.

8.2.2 Input A-ration Menu

The Print Input A-Ration Menu Report option provides the user with a report that displays each recipe entered by Day, Meal, Recipe No., and Item Name for selected menu.

8.2.3 A-Ration Menu with Logistics

This option provides the user with a report that displays the Number of Portions, Cost(\$), Storage Required per cubic foot (Dry, Chilled, Freezer), Labor Hours, Number of Ovens, and any other equipment required for individual recipes in the selected A-Ration Menu. Daily Totals for Cost (\$), Labor Hours, and Number of Ovens are provided as well as Totals for Menu Cycle for Cost(\$ and Storage Requirements.

8.2.4 Optimized Menu with Substitutions

The Print Optimized Menu with Substitutions Report option provides the user with a report that displays the Substituted Menus for the Menu selected by Day, Meal, Recipe/Convenience Product #, and Item Name. Three asterisks (***) before and after an Item Name represents the Item the system recommends based on the objectives entered.

8.2.5 Optimized Menu with Logistics

The Print Optimized Menu with Logistics Report option provides the user with a report that displays that displays the Number of Portions, Cost(\$), Storage Required per cubic foot (Dry, Chilled, Freezer), Labor Hours, Number of Ovens, and any other equipment required for Substituted Menus. Daily Totals for Cost (\$), Labor Hours, and Number of Ovens are provided as well as Totals for Menu Cycle for Cost(\$ and Storage Requirements.

8.2.6 Items with List of all Substitutes

This report option provides the user with a report that displays by Day, Meal, Recipe No. and Item Name the Convenience Substitute No. and Name of the menu items that have been identified

as items to be replaced with Convenience Food Substitutes. Three asterisks (***) before and after an Item Name represents the Item the system recommends based on the objectives entered.

8.2.7 A-Ration versus Optimized Comparison

The Print A-Ration versus Optimized Comparison Report option provides the user with a report displaying by Day and Meal the Daily and Grand Totals for Cost, Storage Requirements, and Labor Hours for the A-Ration Menu and its Substituted Menu.

8.2.8 Equipment Comparison

The Print Equipment Comparison Report options provides the user with a report displaying by Day and Meal the Daily and Grand Total Equipment Requirement for Ovens, Fryers, Kettles, Mixers, and Griddles for the A-Ration Menu and its Substituted Menu.

9. Conclusions

Substantial logistical benefits may be derived through the use of convenience foods and the CFLM is a tool that may be used to identify the potential impact. However, the results given during the logistical optimization runs may vary for a different ship, status, and different selection rates than those modeled in a particular scenario. In addition, the results are dependent on the prices and convenience food items contained in the CFLM database. It is important to maintain current information in the DBMS as the prices and availability of various food items (both A-Ration and convenience food products) change.

The CFLM is based on several assumptions. Currently, the CFLM categories recipes based solely on recipe category (entree, dessert, side dish, etc.) and product type (chicken, fish, pasta, etc.). These two categorizations are used to determine which convenience foods may serve as substitutions for selected recipes. A result of having just two criteria is a list of substitutes with some being potentially incompatible replacements, such as turkey pot pie for roast turkey. To reduce occurrence of these types of substitutions, one may add a third level of recipe categorization to capture the "expensiveness"/quality of item.

There are several effects not modeled by the CFLM that may enhance the savings through convenience food substitutions. First, the convenience food prices in the CFLM are based on current market prices. If the Navy or Department of Defense were to begin procuring these items in bulk, the competition among food manufacturers could drive down prices which would lead to additional savings. Secondly, reductions in labor could lead to maintaining fewer personnel aboard the ship, leading to less portions to prepare and reduced berthing space requirements. This would, in turn, reduce the size of the ship and the accompanying costs.

The model results should be interpreted differently for existing ships and new ships. The existing ships have limited space for freezer storage; thus the scenarios requiring more freezer space than available on a ship may entail more frequent replenishments, thereby increasing operating costs. When applying the results to the design of new ships, this is not as important a consideration. The designer could potentially design the ship with more freezer space and less dry storage space. For existing ships, one may also like to explore conversion of some dry or chilled space to freezer space in conjunction with convenience food substitutions.

10. Recommendations

The Convenience Foods Logistics Model is a useful tool, both for maintaining a database of the Armed Forces Recipe Service, available Convenience Food Products, the Federal Stock Catalog (Group 89), and US Navy Ships; and as a management tool for estimating the logistical requirements for A-Ration menus and projecting the impact of convenience foods in Navy menus. This decision support tool may be used to evaluate storage requirements for future ships, as well as to estimate the logistical requirements for food provisions during special missions.

Although very useful in its current state, as with any prototype, there are features that could be added that would enhance its capabilities. Below is a list of suggested enhancements.

- Perform additional database development to include: the complete population of the AFRS tables with labor and equipment requirements; increase the number of convenience food products and US Navy Ships in the DBMS; and enter the missing data in the logistical information table, Log_file.dbf which is due primarily to the inclusion of local purchase items whose costs/storage data varies.
- Include existing FSC items as possible substitutes. There are many A-Ration items currently available in the supply system which could be used as possible convenience food product substitutions, such as canned soups vs made from scratch, canned chili, frozen vegetables vs fresh, frozen lasagna, cake mixes, etc.
- Include graphical output (i.e. labor hrs for conv. item vs labor hrs for A-Ration item)
- Add a third categorization for defining recipes and convenience foods to better identify convenience food substitutes.
- Add options for a 'DBA' - Maintenance of the database such as: back-up operations, reindexing tables, updating/changing reference tables (such as changing the labor preparation times which would therefore affect any pre-existing data); global increase of prices for convenience foods, reflecting a user-entered rate of inflation; re-generation of the substitution table, SUB_ITEM.dbf; and the re-calculation of all recipe and convenience food costs/storage requirements.
- Improve report saving feature, perhaps using a commercial report building software

product that will allow users to save reports intact (with headers, margins, etc.) as a Word document.

- Integrate with existing systems such as with the Food Management System for shipboard use.
- Allow modeling of available storage as constraints.
- Include the capability to enter recipe ingredients in specific units of measure. This feature would allow a user to use units of measure such as tablespoons and teaspoons. This system would convert the amounts to pounds or the applicable unit of measure required.

This document reports research undertaken at the U.S. Army Soldier Systems Command, Natick Research, Development and Engineering Center and has been assigned No. NRDEC/TR-96/6/6 in the series of reports approved for publication.

APPENDICES

APPENDIX A
CFLM Programs, Screens, Reports (Files
Identified) and Testplan

**Appendix A - CFLM Programs, Screens, Reports
(Files Identified)**

Programs Used in the	
CFLM.PRG	Main Program File
ERRDLG.PRG	Error Dialog Box
INFODLG2.PRG	Information Dialog Box - Type 2
INFODLG3.PRG	Information Dialog Box - Type 3
MESSAGE.PRG	Message Dialog Box
MYNEXT.PRG	Moves to the next record in the lead table
MYPREV.PRG	Moves to the previous record in the lead table
RPTSLCTN.PRG	Used to select reports
WRNDLG.PRG	Warning Dialog Box
CFLM.PIX	Project File for the CFLM - Contains all the compiled programs

CFLM Screens	Program File
Recipe Information Screen	ADD_RECIP.SCX (.SCT, .SPR, .SPX)
Convenience Foods Screen	CONVPROD.SCX (.SCT, .SPR, .SPX)
Logistical Information Screen	LOG.SCX (.SCT, .SPR, .SPX)
Logistical Inquiry - A-Rations Screen	LOG_INQ.SCX (.SCT, .SPR, .SPX)
Logistical Optimization Screen	LOG_OPT.SCX (.SCT, .SPR, .SPX)
Menu Creation Screen	MENUS.SCX (.SCT, .SPR, .SPX)
Price Update Screen	PRICE.SCX (.SCT, .SPR, .SPX)
Ship Information Screen	SHIP.SCX (.SCT, .SPR, .SPX)

View File Name	Description
ALL_TBL.S.VUE	Opens all tables for Database Maintenance (e.g. reindexing)
CONVPROD.VUE	Opens tables required for the Convenience Foods Screen
INGRED.VUE	Opens tables required for the Ingredients Screen
LOG.VUE	Opens tables required for the Logistical Information Screen
LOG_INQ.VUE	Opens tables required for the Logistical Inquiry - A-Ration
LOG_OPT.VUE	Opens tables required for the Logistical Optimization Screen
MENU.VUE	Opens tables required for the Menu Creation Screen
PRICE.VUE	Opens tables required for the Log_File.dbf Price Update
RE_CALC.VUE	Opens tables required to re-calculate costs & storage/100
RECIPE.VUE	Opens tables required for the Recipe Information Screen
SHIPS.VUE	Opens tables required for the Ship Information Screen

Report File	Definition of Report
ACQ_CODE.FRX	List of all Acquisition Advice Codes and their definitions
CF_INFO.FRX	Printout of information on the Convenience Food Products currently in view in the Convenience
COMPARE.FRX	Report Comparing the Cost & Storage Reqmts for the A-Ration Menu and Combination Menu
COMPARE2.FRX	Report Comparing the Equipment Reqmnts for the A-Ration Menu and the Combination Menu
INPUT.FRX	User Input Report, available from the Logistical Inquiry - A-Rations Screen
INPUT1.FRX	User Input Report, available from the Logistical Optimization Screen
LOG_INFO.FRX	Printout of information on the ingredient currently in view (FSC item) in the Log. Info. Screen Screen.
LOG_RECP.FRX	List of Recipes containing the ingredient currently in view in the Log. Information Screen.
MENU.FRX	Printout of the A-Ration Menu currently selected.
NO_NAVY.FRX	Printout of the ingr. in the currently selected menu that are not authorized for the Navy
REC_INFO.FRX	Printout of the current recipe in view and its associated attributes in the Recipe Screen.
REC_SUB.FRX	Printout displaying all Convenience Food Substitutes in the CFLM for the Selected Recipe.
SALAD.FRX	Printout of the Generic Saladbar menu.
SHP_INFO.FRX	Printout of ship information for the ship currently in view in the Ship Information Screen.
SMENU.FRX	Printout of the contents of the Substituted (Combination) Menu
SUB_LOG.FRX	Report displaying the Logistical Requirements for the Substituted Menu.
TEMPLOG.FRX	Logistical Summary (at the Ingredient Level) for the selected A-Ration Menu File.
TEMPMENU.FR	Logistical Summary for the selected A-Ration Menu File.
USE_ACQ.FRX	Report displaying the Logistical Acquisition Codes associated with Ingr in the selected Menu.
USG_CODE.FRX	List of all the Usage Management Codes and their definitions.

ACTION	EXPECTED RESPONSE
Double-click on icon to start CFLM	Opening screen will appear with Main Menu options
Select Recipes from the Main Menu options(or Alt+R)	Recipe screen will be displayed
Press F1 on the keyboard.	The on-line Help System will be activated and a new screen will be displayed with instructions for using this screen. Close file after reviewing.
Page Up/Page Down	Different recipes will be displayed
Select File-New from the menu options to add a new recipe	All fields on the screen will be blank
Enter Recipe #: Enter > or < 6 digit number	Error message will be displayed. Recipe Numbers must be 6 characters in length.
Enter D01800 for recipe number	Error message will be displayed. This recipe number already exists. Enter a new number.
After entering a new 6 digit recipe #, enter data in the remaining fields. Press ' Enter ' after highlighting selection on the popups. Skip Browse Existing Recipes .	Selected data will be refreshed on the screen. Use the ' Tab ' to bypass a field.
Press ' Ingredients ' button to enter ingredients for new recipe.	Ingredient screen will be displayed with the recipe number and description at top of screen.
Select File-Add to select ingredient. User can press first letter of ingredient to move closer to that ingredient in the popup. Repeat this step to add additional ingredients.	Popup of all ingredients in the Federal Stock Catalog will be displayed in the bottom half of the screen.
Once ingredients are entered, the user should press the ' Browse ' button to enter qtys. & units. Attempt to exit the Browse window.	An error message will appear on the status bar informing the user to enter a quantity or unit of measure. The user will not be able to exit the Browse window until qtys. & units for all ingredients have been entered.
Enter qtys. & cook_units for each ingredient.	If an attempt is made to skip a qty or unit, an error message will appear on the status bar. Ignore the beep after entering one letter.
Double click on the smaller control menu box (smaller minus sign) in the upper left hand corner of the screen to exit the Browse window; or single click and select either of the drop down options.	User is returned to the AFRS - Ingredients screen.
Press ' Return ' when complete.	User is returned to the Recipe screen.
Press the ' Calculate Cost/100 ' button to display the cost/100 portions for this recipe item.	There will be a slight delay prior to data appearing in the cost and date fields.
Press the ' Generate Substitution List ' button.	The system will link convenience food products which may be substituted for this recipe item
Press the ' Display Conv Food Substitutes ' button to view the list.	A popup will appear displaying the substitutes. If there are none, a window stating this will be displayed. To exit the pop-up, click the mouse outside the window.
Press 'Exit'.	A message will be displayed prompting the user to press the 'Save' button to save new recipe prior to exiting.
Select File-Search from the menu options	The fields on the screen will be blank.
Select a Recipe Category &/or Product Type	These are the only fields that will be accessible when in the search mode.
Press the ' Execute Search ' button	A popup will appear listing all the recipe items that matched the search criteria. If there are no matches, a message stating this will appear.
Select a recipe from this popup.	The selected recipe will be displayed.

ACTION	EXPECTED RESPONSE
Press the ' Browse Existing Recipes ' button.	A popup listing all recipes in the database will appear.
Select the new recipe that was just entered. Enter the first letter of the recipe number to access the recipe quicker.	The selected recipe will be displayed.
Select File-Delete from the menu options.	A warning message will be displayed asking the user to confirm the deletion. If 'Yes' is selected, the recipe will be deleted. If 'No' is selected, it will not and a message stating this will be displayed in the upper right hand corner of the screen.
Select File-Exit from the menu options or press ' Exit ' button to exit from the Recipe screen.	The user will be returned to the main menu.
Select CFS from the Main Menu options (or Alt+C)	The Convenience Foods Screen will appear.
Page Up/Page Down	Different Convenience Food Products will be displayed
Select File-New from the menu options to add a new CF product.	All fields on the screen will be blank.
Select a Category and Manufacturer . Select an existing manufacturer.	Selected data will be refreshed on the screen. The user will be prompted to complete all fields which must contain data (such as the portions/cost, etc.) and will be prompted if incompatible data (such as the portion info) is entered. When the user enters a mfr. product code, it will appear in the upper right hand corner of the screen proceeded by the system's mfr. code and padded with '0s' if necessary to create a 10 digit code.
Press the ' Calculate Req./100 ' button to display the cost and storage required/100 portions.	After a slight delay, the cost and storage data will be displayed as well as the current date.
Press the ' Save ' button to save new item.	The system is returned to the 'Edit' mode. A new option can take place.
Select File-New from the menu options to add a new CF product, but enter a new manufacturer, <i>StirFry Classics</i> and use ' <i>SF</i> ' for the manufacturer code.	An error message will be displayed, informing the user that the mfr. code, <i>SF</i> , already exists. Select another 2 character code, <i>SC</i> , as an example. Click outside the pop-up of existing manufacturers to access the new manufacturer window.
When all data has been properly entered, press ' Save '	The system is returned to the 'Edit' mode. A new option can take place.
Select File-Search from the menu options to locate an existing item.	All fields will appear blank.
Enter a Category , Manufacturer , and/or Product Type .	These are the only fields that will be searched on.
Press the ' Execute Search ' button.	A popup of CF products that match the search criteria will be displayed.
Locate one of the CF products that was just entered, either by using the Page Up/Page Down keys, or by doing a search. Once displayed. Select File-Delete from the menu options.	A warning message will be displayed asking the user to confirm the deletion. If 'Yes' is selected, the CF item will be deleted. If 'No' is selected, it will not and a message stating this will be displayed in the upper right hand corner of the screen.
Select File-Exit from the menu options or press ' Exit ' button to exit from the CF screen.	The user will be returned to the main menu.
Select Menus from the Main Menu options (or Alt+M)	The Menu Creation screen will be displayed.
Select File-Select Menu from the menu options	A Windows Open dialog box will appear.
Select an existing menu (ex. <i>fivenew.dbf</i>).	User can select from other directories, but the file must have been created, or have the same structure as the menu files created from this screen. (Note: Certain system directories are restricted; the user will not be allowed to access these.) Once selected, the menu file name and first entry is displayed.

ACTION	EXPECTED RESPONSE
Page Up/Page Down to view menu selections, or press the ' <i>View Menu</i> ' button.	When the ' <i>View Menu</i> ' button is pressed, the menu may be viewed in its entirety, as displayed in a popup.
Press the ' <i>Add Recipe</i> ' button.	A blank record is added to the menu. The last day and meal shown are pre-entered to minimize selections since each day/meal have multiple recipes. However, these values may be changed.
Press the ' <i>Select Recipe</i> ' button to select from the popup of recipes in the system. Highlight a recipe and press 'Enter'	The recipe selected is displayed. The default value for the selection rate is entered, but may be changed, if desired. (Note: An existing recipe may be changed by selecting a new recipe when the existing one to be changed is in view.)
Press the ' <i>Delete Recipe</i> ' button to delete a recipe from the menu.	The user will be prompted to confirm the deletion.
Press the ' <i>Save Menu</i> ' button to save changes.	The user will be prompted to save changes to the existing file, or a new file. If saving to a new file, the cursor will be on the field where the new filename should be entered. If the user tries to save to an existing file, a message will be displayed to confirm this action.
Press the ' <i>Close Menu</i> ' button to close the menu file in view.	The menu file is closed and a new one may be selected. If this button is pressed before the file is saved, the user will be prompted to save changes to an existing file, a new file, or to close without saving.
Select File-Create Menu from the menu options	A new menu file is displayed in which to enter recipe selections.
After entering recipes, press ' <i>Save Menu</i> '	The user will be prompted to enter a new file name. Note: The file name is given the default path, but the user may change the directory/path.
Press the ' <i>Close Menu</i> ' button to close the menu file in view.	The user will not be able to exit the Menu Creation screen until the menu file in view is closed.
Select File Exit or press the ' <i>Exit</i> ' button to exit the Menu screen	The user is returned to the main menu.
Select Log Data from the Main Menu options (or Alt+L).	The Logistical Information screen will appear.
Page Up/Page Down to view records in the Logistical File.	The items found in the Federal Stock Catalog are displayed.
Select Help from the menu options.	A new screen will be displayed with a brief list of instructions for using this screen.
Press the File -Exit button to return to the Logistical Information screen.	The user is returned to the Logistical Information screen.
Select File-New from the menu options	A new record is added, the fields shown are blank.
Enter the NSN. First enter < or > 13 digits	An error message will appear if the NSN is < or > 13 digits. The system only allows 13 digits.
Enter a valid number and continue entering the data in their appropriate fields.	The screen is refreshed with the data entered/selected. The information is saved directly to the database file. Press ' <i>Exit</i> ' or ' <i>Save</i> ' after data entered.
Locate a specific item by pressing the ' <i>Browse Existing Items</i> ' button.	A popup of all the items in the logistical database file will be displayed. When an item is selected, its associated information will be displayed on the screen.
Locate a specific item by selecting File-Search from the menu options.	The screen will display blank fields in which the user may enter key words in the 'Description' field that may be found in the name of the item and/or select a storage type.
After entering the search criteria, press the ' <i>Execute Search</i> ' button.	A popup of all items matching the search criteria will appear, from which the user may select. If no items matched, a message stating this will appear.

ACTION	EXPECTED RESPONSE
Select an item from the popup.	This item and its associated attributes will be displayed.
Locate the item that was just entered. After doing so, select File-Delete from the menu options.	The user will be prompted to confirm the deletion.
Press the ' Recipes ' button.	A popup will display all recipes that contain the specified NSN item. These recipes would be impacted if the NSN item was not available.
Press the ' Exit ' button to close the Logistical Information screen.	The user is returned to the main menu.
Select Ship Info from the Main Menu (or Alt+S).	The Ship Information Screen will be displayed.
Page Up/Page Down to view Ship information.	Ships recorded in the Ship database file are displayed with their associated attributes.
Select File-New to enter a new ship.	A new record is added; the fields displayed are blank.
Enter data in the appropriate fields.	The screen is refreshed when data is entered/selected. Note: Once the user selects a classification of ship, the types within the classification displayed in the ' Type ' popup are only those associated with the classification selected. Furthermore, the ' Class ' popup displays only those classes associated with the ' Type ' selected. To enter the <i>Hull No. of Ship</i> field, type in the given letters again with the appropriate number.
Press the ' Save ' button to save the new information.	The ship information entered will be saved; a new menu option may be selected.
Select File-Delete from the menu options.	The user will be prompted to confirm the deletion.
Select File-Search from the menu options.	The screen will display blank fields in which the user will select Classification of Ship, Type w/in Classification, and/or Class of Ship.
Press the ' Execute Search ' button to initiate a search in accordance with the specified criteria.	A popup will display all items matching the search criteria. From this list, the user may make a selection. The fields will be filled to contain the associated information.
Press the ' Exit ' button or select File-Exit from the menu options to close the Ship Information Screen	The user is returned to the main menu.
Select Run Logistical Inquiry (A-Rations) from the 'suboptions' displayed when Options is selected from the Main Menu.	The Logistical Inquiry - A_Rations screen will be displayed.
Select Inquiry - New Inquiry from the menu options.	A new record is added to the Log_Inq table which serves as a template to store user input. A message will appear indicating that the user should select a menu.
Double click on the ' Select Menu ' button.	A Windows Open dialog box will appear.
Select an existing menu (ex. fivenew.dbf)	User can select from other directories, but the file must have been created, or have the same structure as the menu files created from this screen. (Note: Certain system directories are restricted; the user will not be allowed to access these.) Once selected, the menu file name is displayed.
Press the ' Select Ship ' button.	A popup list of the ships in the database will be displayed.
Select a ship from this list.	The selected ship's name and hull no. will be displayed. The ship's complement size (enlisted only) will also be displayed.
Enter the % of the total # of <i>customers</i> (those subsisting from the general mess) who subsist from the speedline (if one is available).	This % is used to subtract the portion of available storage space used for speedline items.
Enter the % of the total # of <i>customers</i> who visit the salad bar, if the default value is incorrect.	This % is used to subtract the portion of available storage space used for standard salad bar items.

ACTION	EXPECTED RESPONSE
Enter T or F to the next two statements, whether all ranks subsist from the general mess (or if separate messes are available), and whether the ship is at sea (or inport).	If all ranks subsist from the general mess, the no. of total <i>customers</i> shown will increase to include the total number of personnel on the ship. If the ship is at sea, the <i>at sea</i> default values of the attendance rates will be entered; if inport, the <i>inport</i> values will be displayed.
Adjust the attendance rates shown, if desired.	These values are used to determine the number of portions recipe item should be prepared.
Press the ' <i>Calculate Logistics</i> ' button. When the calculations are complete, click ' <i>OK</i> ' to continue.	The system will process the user's input, determining the portions, ingredient amounts, labor, equipment, etc. required for the given menu. The system produces a dialog box notifying the user that the system is calculating and that it will take a few moments. Once the calculation process is complete, the system will produce a dialog box notifying the user that the calculations are complete.
Enter the file names which should be used to store the calculations, if desired.	Note: The default path/directory will be displayed when saving this information. The user must enter a backslash after the default before entering a new filename.
Select from the report options displayed when Reports is selected from the menu options.	The user will be able to preview or print these reports. A report may be re-selected as often as desired. However, once a new inquiry is entered, or the user leaves this screen, this information is lost unless the report was printed, or the data saved to a file.
Click on the ' <i>Preview</i> ' radio button to view the results. Click on the ' <i>OK</i> ' button to return to the Logistical Inquiry - A_Rations screen.	The Report Generation window appears. When the preview option is selected, a page preview window appears. The user may use the scroll bars, the ' <i>Page</i> ', ' <i>Next</i> ', ' <i>Previous</i> ', and <i>zoom</i> buttons to view the report.
Select an option from the Reports menu. Click on the ' <i>Print</i> ' radio button to print the results.	The designated report is printed to the attached printer.
Press the ' <i>Close Menu</i> ' button to close the menu file, followed by the ' <i>Exit</i> ' button or File - Exit from the menu options.	The menu file is closed and the user is returned to the main menu. Note: Additional inquiries may be made prior to leaving this screen. The user may change information to the current inquiry and re-calculate logistics, if desired.
Select Run Optimization Model from the 'suboptions' displayed when Options is selected from the main menu.	The Logistical Inquiry Screen will be displayed with additional features.
Select Inquiry - New Inquiry from the menu options.	A new record is added to the Log_Inq table which is serves as a template to store user input. A message will appear indicating that the user should select a menu.
Double click on the ' <i>Select Menu</i> ' button.	A Windows Open dialog box will appear.
Select an existing menu (ex. <i>fivenew.dbf</i>).	User can select from other directories, but the file must have been created, or have the same structure as the menu files created from this screen. (Note: Certain system directories are restricted; the user will not be allowed to access these.) Once selected, the menu file name is displayed.
Press the ' <i>Select Ship</i> ' button.	A popup list of the ships in the database will be displayed.
Select a ship from this list.	The selected ship's name and hull no. will be displayed. The ship's complement size (enlisted only) will also be displayed.
Enter the % of the total # of <i>customers</i> (those subsisting from the general mess) who subsist from the speedline (if one is available).	This % is used to subtract the portion of available storage space used for speedline items.
Enter the % of the total # of <i>customers</i> who visit the salad bar, if the default value is incorrect.	This % is used to subtract the portion of available storage space used for standard salad bar items.

ACTION	EXPECTED RESPONSE
Enter T or F to the next two statements, whether all ranks subsist from the general mess (or if separate messes are available), and whether the ship is at sea (or inport).	If all ranks subsist from the general mess, the no. of total <i>customers</i> shown will increase to include the total number of personnel on the ship. If the ship is at sea, the <i>at sea</i> default values of the attendance rates will be entered; if inport, the <i>inport</i> values will be displayed.
Adjust the attendance rates shown, if desired.	These values are used to determine the number of portions/recipe item should be prepared.
Enter the desired substitution rates (%) for each of the meal categories shown.	These values will be used in the optimization process. (ex. If '30' is entered for the substitution rate for <i>Entrees</i> , then the model will attempt to substitute 30% of all main entrees in the menu cycle with convenience food products.
Enter <i>weights</i> for at least one (or more) of the objectives shown. These values must be between 1-10.	The model will consider the weights when substituting convenience food products. (ex. If the user enters an '8' for the <i>Minimize Costs</i> objective, and '1' for the <i>Minimize Freezer Storage</i> objective, the model will substitute the convenience food products which costs the least over ones that require the minimum freezer storage if multiple products are available.)
Press the ' <i>Generate Substituted Menu</i> ' button.	The system will process the user's input, produce a new menu with a mix of AFRS Recipe items and convenience food substitutes, and determine the portions, labor, equipment, etc. required for the given menu. The system will generate a message that notifies the user that the process will take a few moments; click ' <i>OK</i> ' to continue. If the data entered is not possible, the system will display an error message to notify the user. In this case, reduce the substitution rate and re-run. When the processing is complete, the system will display another dialog box to notify the user.
Enter the file names which should be used to store the calculations, if desired.	Note: The default path/directory will be displayed when saving this information. The user may change this.
Select from the report options displayed when Reports is selected from the menu options.	The user will be able to preview or print these reports. A report may be re-selected as often as desired. However, once a new inquiry is entered, or the user leaves this screen, this information is lost unless the report was printed, or the data saved to a file.
Click on the ' <i>Preview</i> ' radio button to view the results. Click on the ' <i>OK</i> ' button to return to the Logistical Inquiry - A_Rations screen.	The Report Generation window appears. When the preview option is selected, a page preview window appears. The user may use the scroll bars, the ' <i>Page</i> ', ' <i>Next</i> ', ' <i>Previous</i> ', and <i>zoom</i> buttons to view the report.
Select an option from the Reports menu. Click on the ' <i>Print</i> ' radio button to print the results.	The designated report is printed to the attached printer.
Press the ' <i>Close Menu</i> ' button to close the menu file, followed by the ' <i>Exit</i> ' button or File - Exit from the menu options.	The menu file is closed and the user is returned to the user is returned to the main menu. Note: Additional inquiries may be made prior to leaving this screen. The user may change information to the current inquiry and re-calculate logistics, if desired.
Select Update Prices from the suboptions displayed when Options is selected from the main menu.	The Option - Update Prices screen will be displayed. Important Note: This option should only be used with caution; improper use could result in corruption of the Logistics File and cost information in the Recipe File.
Place a floppy disk containing copies of the tables, LOG_FILE.dbf & LOG_FILE.cdx in Drive A. (Copy files from the C:\CFLM\TABLES directory.) Rename these files (e.g. NW_PRICE.dbf & NW_PRICE.cdx). Enter data in the fields on the screen corresponding to the location of this file. (e.g. A\NW PRICE.dbf)	A dialog box will appear telling the user to wait while the system attempts to open the updating file.

ACTION	EXPECTED RESPONSE
Enter the data field containing the updated prices (unit_price), and the appropriate fiscal month/year, and price month/year. (The defaults are 10/95 and 6/95. Prices found in the initially installed CFLM for LOG_FILE.dbf were from 10/94 and 6/94. Therefore, for testing, enter 10/94 and 6/94.)	The respective data fields will be shown with the data entered.
Click on the 'Update Prices 'button.	If data has been properly entered, a message will appear when the update process is complete.
Click on the 'Update Recipe Costs 'button.	A dialog box will appear alerting the user that this process will take approximately one hour.
Click on 'Yes 'to continue or 'No 'to abort process. Recommend clicking 'No '.	Message will appear stating that this process has been aborted.
Click on the 'Close File ' and then the 'Exit' button to close the updating file and exit the Update Prices screen.	The user is returned to the main menu.
Select File-Exit from the main menu screen to close the Convenience Foods Substitution Model.	The Convenience Foods Substitution Model will close.

APPENDIX B

CFLM Tables

TABLE NAME	PAGE #
ACQ_CODE.dbf	69
AFRSCARD.dbf	43
A_ITEMS.dbf	43
CLASSIF.dbf	61, 62
CONV LAB.dbf	47, 50
CONVPROD.dbf	44
ERRORS.dbf	71-73
LABOR.dbf	47, 48-49
LOG_FILE.dbf	45
LOG_INQ.dbf	46-47
MANUFACT.dbf	50, 51
MEAL_NAME.dbf	59
MENU.dbf	73, 74-77
MISC STR.dbf	57, 58
NO_NAVY.dbf	50
PRODTYPE.dbf	51, 52-53
PROG_ERR.dbf	71
PROTOMEN.dbf	53
RATES.dbf	56
REC CTGR.dbf	59
SHIPCLAS.dbf	61, 65-66
SHIPS.dbf	60
SHIPTYPE.dbf	62, 62-65
STOR TYPE.dbf	67
SUB_ITEM.dbf	67
TEMPLOG.dbf	68
TEMPSUMM.dbf	55
TEMPX01.dbf & TEMPX02.dbf	54
USG_CODE.dbf	70

A_ITEMS.dbf

This table contains an index of all the AFRS Recipes.				
FIELD NAME	TYPE	WIDTH	DEC.	DESCRIPTION OF FIELD
RECP_NUM	Character	6		Recipe number
ITEM_NAME	Character	40		Item name
PROD_CODE	Character	4		Code for the Product type
CAT_CODE	Character	2		Category Code (ex. AP/EN/DS)
PORTION	Character	15		Per person portion
NO_OVENS	Numeric	5	2	# of Ovens reqd. to prepare 100 prtns.
KETTLE	Logical	1		Indicates if Stm Kettles are reqd.
FRYERS	Logical	1		Indicates if Fryers are reqd.
GRIDDLE	Logical	1		Indicates if Griddles are reqd.
MIXERS	Logical	1		Indicates if Mixers are reqd.
DRY_STORE	Numeric	8	2	Dry Storage space reqd. for ingredients.
CHILL_STOR	Numeric	8	2	Chilled Storage space reqd. for ingredients.
FRZR_STORE	Numeric	8	2	Freezer space reqd. to store ingredients.
COST	Numeric	8	2	Cost/100 portions
LABOR1	Numeric	8		Labor reqd. to prepare 100 portions.
LABOR2	Numeric	8		Labor reqd. to prepare 200 portions.
LABOR3	Numeric	8		Labor reqd. to prepare 500 portions.
CHANGE	Character	10		Not used at this time.
COST_CALC	Date	8		Date Cost/100 was Calculated.
SUB_DATE	Date	8		Date Substitution List was Generated.
LABR_CODE	Character	5		Labor Preparation Category Code
WATER_100	Numeric	8	2	Water Required/100 Portions (GL)
2112 records				
6/8/95				

AFRSCARD.dbf

Ingredients per (AFRS) Recipe				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
RECP_NUM	Character	6		AFRS Recipe Number
NSN	Character	13		National Stock Number
INGD_NAME	Character	40		Ingredient Name
COOK_UNIT	Character	2		Unit of Measure
QTY_100	Numeric	8	4	Amount Needed/100 portions of Recipe
10821 Records				
6/8/95				

CONVPROD.dbf

Convenience Food Products & Related Logistical Data				
FIELD NAME	TYPE	WIDTH	DEC.	DESCRIPTION OF FIELD
ITEMNUM	Character	10		Item Number (man_code + ord_r_code)
PRODUCT	Character	27		Product Name
CAT_CODE	Character	2		Category Code
MAN_CODE	Character	2		Manufacturer's Code
PROD_CODE	Character	4		Code for the Product type
ORDR_CODE	Character	10		Mnfr's Product Code (actual)
PORT	Numeric	5	2	Per person portion
SIZE	Character	5		Unit of Measure for Portion (oz, lb)
SV_CS	Numeric	5		Servings per case
CASE	Character	7		# Units/case
PK	Character	4		Unit of Measure for Case (oz, lb)
CASE_WT	Numeric	7	2	Weight/case
COMMENTS	Character	30		misc - description of packaging, etc.
CASE_DIM	Character	30		Dimensions of Case
COST_UNIT	Numeric	8	2	Cost/case
STOR_TYPE	Character	1		Type of Storage Required (ex. f-freezer)
CS_CU_FT	Numeric	8	2	Cubic Feet/case
SELRATE	Numeric	3		Sold by (varies with manufacturer/pkg)
ADJ_SVGS	Numeric	5	2	Adjusted Portion (compared to A_Ration)
NO_OVENS	Numeric	5	2	# of Ovens reqd. to prepare 100 prtns.
KETTLE	Logical	1		Indicates if Stm Kettles are reqd.
FRYERS	Logical	1		Indicates if Fryers are reqd.
GRIDDLE	Logical	1		Indicates if Griddles are reqd.
MIXERS	Logical	1		Indicates if Mixers are reqd.
LABOR1	Numeric	8		Labor reqd. to prepare 100 portions.
LABOR2	Numeric	8		Labor reqd. to prepare 200 portions.
LABOR3	Numeric	8		Labor reqd. to prepare 500 portions.
AFRS_PORT	Numeric	5	2	A_Ration Recipe portion
AFRS_UNITS	Character	5		Unit of measure for the Afrs portion.
PRICE_DT	Date	8		Date prices are effective (from mftr list)
GROSS_WT	Numeric	7	2	Gross weight of product (as sold)
CS_LAYER	Numeric	6	2	Number of layers/case
LAYER_PLT	Numeric	6	2	Number of layers/pallet
CS_PLT	Numeric	6	2	Number of cases/pallet
COST	Numeric	8	2	Cost/100 portions
COST_CALC	Date	8		Date Cost/100 was Calculated.
LABR_CODE	Character	5		Labor Preparation Category Code
STOR_100	Numeric	8	2	Storage Required/100 portions
345 Records				
6/8/95				

LOG_FILE.dbf

Logistical Info- A-Rations				
FIELD NAME	TYPE	WIDTH	DEC.	DESCRIPTION OF FIELD
FSC_MONTH	Character	2		Fiscal Month for Listed Price
FSC_YEAR	Character	2		Fiscal Year for Listed Price
ACTION	Character	1		(?Indicates changes,& ?)
INDEX_NO	Character	5		A sequence # (alphabetical position)
NAVY_CODE	Character	3		Navy Code (FIC)
NSN	Character	13		National Stock Number
STORAGE	Character	1		Type of Storage (ex. f - freezer)
PERISHABLE	Character	2		P - Perishible SP - Semi-perishible
DESCRIPTN	Character	50		Name of Item (Ingredient)
UNIT_ISSUE	Character	2		Unit of Issue (LB, CN, etc)
CON_FACTOR	Numeric	7	3	Conversion Factor (* for bulk units to lbs)
CONFACNOTE	Character	2		Conversion Factor Note (how to use
REQ_NETLBS	Numeric	10	4	Required Net lbs (for use in model)
REQ_CASES	Numeric	10	4	Required Net Cases (for use in model)
REQ_UNITS	Numeric	10	4	Required Units (for use in model)
USAGE_MGT	Character	4		Usage Management Codes (for Restrictions)
ACQ_ADVICE	Character	2		Acquisition Codes (for Contracting use)
PACK_UNIT	Character	2		Package Units
UNITS_CASE	Numeric	4		No. of units/case
EXP	Numeric	3		
CASES_PALT	Numeric	3		Cases/pallet
CASE_G_LBS	Numeric	3		Gross lbs/case
CAS_NETLBS	Numeric	3		Net lbs/case
CASE_CU_FT	Numeric	4	2	Cubic Feet of Case
C_LENGTH	Numeric	4	1	Length of Case
C_WIDTH	Numeric	4	1	Width of Case
C_HEIGHT	Numeric	4	1	Height of Case
UNIT_PRICE	Numeric	6	2	Price/unit
PRICEMONTH	Character	2		Month (of current price list)
PRICEYEAR	Character	2		Year (of current price list)
**		168		
1917 Records				
6/8/95				

LOG_INQ.dbf

Note: This Table will be used as a template for creating tables to be used when calculating logistical information.					Apply to Meal #
FIELD	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD	
MENU	Character	30		Menu File Name	
NEWMENU	Character	30		File Name for New Menu	
SHIP_NAME	Character	30		Name Of Ship	
NO_CUST	Numeric	6		Total Number of 'Customers' (subsisting from the general mess)	
SUBSIST	Logical	1		All ranks subsist from general mess?	
MAXDRY	Numeric	8	2	Max Amount Dry Storage Available (based on no_cust)	
MAXCHILL	Numeric	8	2	Max Amount Chill Storage Available (based on no_cust)	
MAXFRZR	Numeric	8	2	Max Amount Freezer Storage Available (based on no_cust)	
NO_SPDLN	Numeric	4	1	Number Subsisting from Speedline (%)	2
MSPD_CST	Numeric	10	2	Approx. Cost of Generic Speedline Menu Items based on no_cust &	
MSPD_D	Numeric	8	2	Cubic Feet of Dry Storage Required for Generic Speedline Menu	
MSPD_C	Numeric	8	2	Cubic Feet of Chilled Storage Required for Generic Speedline Menu	
MSPD_F	Numeric	8	2	Cubic Feet of Freezer Storage Required for Generic Speedline Menu	
MSPD_W	Numeric	8	2	Gallons of Water Required for Generic Speedline Menu Items based	
NO_SALAD	Numeric	4	1	Number Selecting from the Salad Bar (%)	2,3
MSAL_CST	Numeric	10	2	Approx. Cost of Generic Salad Bar Menu Items based on no_cust &	
MSAL_D	Numeric	8	2	Cubic Feet of Dry Storage Required for Generic Salad Bar Menu	
MSAL_C	Numeric	8	2	Cubic Feet of Chilled Storage Required for Generic Salad Bar Menu	
MSAL_F	Numeric	8	2	Cubic Feet of Freezer Storage Required for Generic Salad Bar Menu	
MSAL_W	Numeric	8	2	Gallons of Water Required for Generic Salad Bar Menu Items based	
MXTR_CST	Numeric	10	2	Approx. Cost of Standard Miscellaneous Menu Items based on	
MXTR_D	Numeric	8	2	Cubic Feet of Dry Storage Required for Standard Miscellaneous	
MXTR_C	Numeric	8	2	Cubic Feet of Chilled Storage Required for Standard Miscellaneous	
MXTR_F	Numeric	8	2	Cubic Feet of Freezer Storage Required for Standard Miscellaneous	
MXTR_W	Numeric	8	2	Gallons of Water Required for Standard Miscellaneous Menu Items	
AT_SEA	Logical	1		T=At Sea, F=In Port	
A_RATE1	Numeric	4	1	Attendance Rate (1st Meal)	1
A_RATE2	Numeric	4	1	Attendance Rate (2nd Meal)	2
A_RATE3	Numeric	4	1	Attendance Rate (3rd Meal)	3
A_RATE4	Numeric	4	1	Attendance Rate (4th Meal)	4

LOG_INQ.dbf

Note: This Table will be used as a template for creating tables to be used when calculating logistical information.					Apply to Meal #
FIELD	TYPE	WIDTH	DE	DESCRIPTION OF FIELD	
A_RATEW1	Numeric	4	1	Attendance Rate (In Port, WE - 1st Meal)	1
A_RATEW2	Numeric	4	1	Attendance Rate (In Port, WE - 2nd Meal)	2
A_RATEW3	Numeric	4	1	Attendance Rate (In Port, WE - 3rd Meal)	3
A_RATEW4	Numeric	4	1	Attendance Rate (In Port, WE - 4th Meal)	4
SUB_AP	Numeric	4	1	Substitution Rate - Appetizers (L&D)	2,3,4
SUB_BE	Numeric	4	1	Substitution Rate - Breakfast entrees	1
SUB_BRD	Numeric	4	1	Substitution Rate - Brds/Mfns	1
SUB_BS	Numeric	4	1	Substitution Rate - Brkfst Side ITEMes	1
SUB_DSRT	Numeric	4	1	Substitution Rate - Bakery/Dessert (B,L&D)	1,B
SUB_EN	Numeric	4	1	Substitution Rate - Entrees (L&D)	2,3,4
SUB_SIDE	Numeric	4	1	Substitution Rate - Side ITEMes (L&D)	2,3,4
WT_COST	Numeric	2		Weight added to Cost (default is 0)	
WT_LABR	Numeric	2		Weight added to Labor (default is 0)	
WT_DRY	Numeric	2		Weight for Dry Storage (default is 0)	
WT_CHILL	Numeric	2		Wt. for Chilled Storage (default is 0)	
WT_FRZR	Numeric	2		Wt. added to Frzr Storage (default is 0)	

LABOR.dbf

Labor Codes				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
LABR_CODE	Character	5		Labor Code
LABR_DESC	Character	30		Labor Description
TIME_100	Numeric	8		Time to Prepare 100 Portions (min)
TIME_200	Numeric	8		Time to Prepare 200 Portions (min)
TIME_500	Numeric	8		Time to Prepare 500 Portions (min)
73 Records	6/8/95			

CONV_LAB.dbf

Labor Codes - Convenience Food Products				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
LABR_CODE	Character	5		Labor Code
LABR_DESC	Character	30		Labor Description
TIME_100	Numeric	8		Time to Prepare 100 Portions (min)
TIME_200	Numeric	8		Time to Prepare 200 Portions (min)
TIME_500	Numeric	8		Time to Prepare 500 Portions (min)
13 Records	6/8/95			

LABOR.dbf
(Reference Table - Contents)

Labor Code	Description	Time (min) /# portions		
		/100	/200	/500
BE	EASY BAKE	45	80	120
BMP	MEATLOAF: MORE PREP REQ.	120	210	300
BMX	BAKE W/MIX	15	30	45
BP	PREPARE & BAKE	100	170	250
BPRG	PROG. COOK/BAKED	100	100	100
BPRS	PREPARE, ROAST & SLICE	150	200	330
BRD	BREADS	45	60	105
BRS	BREADS: SHORT TIME	30	45	90
BS	BAKE FROM SCRATCH	30	35	50
BTR	BATTER	10	10	10
BWSM	WGH, SL, MLD, BAKE (SALS.STK)	90	180	280
BYD	BAKE/FRY W/YEAST DOUGH: DIFFI	135	180	260
BYE	BAKE/FRY W/YEAST DOUGH: EASY	110	150	200
BYMX	BAKE/FRY W/YEAST USING A MIX	60	80	180
CKD	CAKE DONUTS	60	75	105
CKDM	CAKE DONUTS W/ MIX	45	60	75
CKDMT	CAKE DONUTS W/ MIX & TOPP	60	75	90
CKDT	CAKE DONUTS W/TOPPING	75	90	120
COM	COMMERCIALY PURCHASED ITEM	10	20	35
COMP	COMMERCIALY PURCH.W/PREP.	30	50	85
COMX	COOKIES W/MIX	45	60	120
COSCR	COOKIES FROM SCRATCH	60	75	155
CP	COLD PREP. REQ. (SANDWICH)	50	100	180
CRPF	CREAM PUFFS	120	165	240
CSC	COLD SAUCE	20	25	35
CSP	COLD SAUCE: XTRA PREP. REQ	25	40	60
EGGS	EGGS TO ORDER/OMELETTES	90	105	120
FPRG	PROG. COOK/FRIED	125	150	180
FR	FRIED - NO PREP	30	45	90
FRP	FRIED-W/PREP	50	80	150
FRT	FRUIT CUP/ITEM	75	105	180
FRXP	FRIED - W/EXTRA PREP REQ	290	400	600
GBH	BACON/HAM GRILLED OR OVEN GRL	25	35	80
GE	EASY GRIDDLE (PANCAKES)	60	80	120
GP	GRIDDLE: MORE PREP. REQ.	80	100	140
GPRG	PROG. COOK/GRIDDLE	110	120	150
GXP	GRILL-XTRA PREP. REQ (FAJITAS)	180	320	600
HSC	HOT SAUCE/GRAVY	25	40	60
HSMX	HOT SAUCE/GRAVY FROM A MIX	20	25	35
JUICE	CND/CONC JUICE MIX	10	20	45

LABOR.dbf
(Reference Table - Contents)

Labor Code	Description	Time (min) /# portions		
		/100	/200	/500
KE	KETTLE COOKED - EASY	15	25	45
KPRG	PROG. COOK/STEAM	110	130	180
LASGN	LASAGNE/PREP. CASSEROLE	165	210	420
MFNX	MUFFINS W/MIX	40	60	90
MFSC	MUFFINS FROM SCRATCH	60	75	105
MXFRE	MIX & FRY: EASY	35	45	60
MXFRP	MIX & FRY: MORE PREP. REQ	50	80	150
OAGR	OATMEAL/GRITS	10	15	20
OTHDS	OTHER DESSERTS	30	45	90
PDGL	PUDDINGS/GELATINS W/MIX	15	20	30
PIECM	CREAM/CUSTARD PIES W/MIX	60	75	135
PIECS	CREAM/CUSTARD PIES: SCRATCH	100	125	200
PIEFP	FRUIT PIE/COBLRS W/PREP FILLG	45	60	120
PIEFS	FRUIT PIE/COBLRS: SCRATCH	75	90	150
PRCE	EASY PASTA/RICE CASSEROLE	45	65	100
PSRCG	PASTA/RICE MIX: GRIDDLE	60	75	135
PSRCO	PASTA/RICE MIX: OVEN PREP	45	60	120
PSTRC	PASTA/RICE	20	30	45
PZ	PIZZA	150	200	240
ROL	ROLLS	50	80	180
SPC	CONDENSED CANNED/DEHYD. SOUPS	10	20	45
SPS	SOUPS FROM SCRATCH	30	60	120
STE	STEW: EASY PREP	50	80	160
STP	STEW: MORE PREP TIME REQ	100	150	210
STXP	STEW: EXTRA PREP TIME REQ	180	300	480
TST	TOAST/WAFFLES	15	25	45
VC	VEGETABLE ITEM/CASSEROLE	20	50	80
VCE	EASY VEG OR POT. ITEM/CASSEROL	15	20	35
VFR	FRESH VEGETABLES	75	105	180
VFZ	FROZEN VEGETABLES	20	45	105
VPC	VEGETABLE ITEM/CASSEROLE (POT)	30	60	120
VS	VEGETABLE SALAD	75	105	180
VSTRF	STIR FRY VEGETABLES	40	60	100

CONV_LAB.dbf
(Reference Table - Contents)

Labor Code	Description	Time (min)/# portions		
		/100	/200	/500
BFE	BREAKFAST ENTREE ITEMS	25	50	120
BHT	BAKERY HEAT/NON INDIV ITEMS	15	25	45
BKI	BAKERY INDIVIDUAL (NON-YEAST)	20	30	70
BTT	READY MADE BATTERS	20	35	90
FRY	DEEP FAT FRYER	30	45	90
GRD	GRIDDLE/NON-PROGRESSIVE	25	35	80
HAS	HEAT AND SERVE	7	15	35
HAT	HEAT AND TRANSFER	15	30	60
HT1	HEAT, INDIV. PKGD(LOW COUNT)	25	50	120
HT2	HEAT, INDIV. PKGD(HIGH COUNT)	20	40	95
KET	HEAT IN KETTLE/NON-PROGRESSIVE	10	20	45
PST	PASTA	20	30	45
TAS	THAW/SERVE	10	20	35

MANUFACT.dbf

Manufacturer Codes				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
MAN_CODE	Character	2		Manufacturer's Code
MAN_DESC	Character	16		Manufacturer's Name
23 Records				
6/8/95				

NO_NAVY.dbf

Table used as a template when identifying items not				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
NSN	Characte	13		NSN number
DESCRIPTN	Characte	50		Description
USAGE_MGT	Characte	4		Usage Management Code
ACQ_ADVICE	Characte	4		Acq Advice Code
6/8/95				

MANUFACT.dbf
(Reference Table - Contents)

MAN_CODE	MAN_DESC
AJ	AUNT JEMIMA
AL	ALLEN CANNING
AR	ARMOUR/CON AG
AW	AWARD/CONAGRA
BA	BANQUET
CD	CONTADINA
CK	CHUN KING/CONAGR
CM	CAMPBELLS
FM	FARMRICH
GG	GREEN GIANT
HC	HLTHY CHOICE/CON
HL	HILLSHIRE
KP	KARPS
LC	LEAN CUISINE
MC	MCCARTY
OR	ORE-IDA
PL	PILLSBURY
RB	READI-BAKE
RH	RICH'S
SF	STOUFFERS RFY
SL	SARA LEE
ST	STOUFFERS
UB	UNCLE BENS

PRODTYPE.dbf

Product Types				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
PROD_CODE	Character	4		Product Code
PROD_DESC	Character	30		Product Description
55 Records				
6/8/95				

PRODTYPE.dbf
(Reference Table - Contents)

PRODUCT	PRODUCT DESCRIPTION
CODE	
ASIA	ASIAN ITEM
BAKG	BREADS/BISCUITS/ROLLS
BEFG	GROUND BEEF ITEM
BEFR	ROAST BEEF ITEM
BEFS	BEEF (STEAK) ITEM
BKFT	BREAKFAST ITEMS
CAJN	CREOLE/CAJUN ITEM
CAKE	CAKES
CDAP	COLD APPETIZER
CDBV	COLD BEVERAGE
CHKN	CHICKEN ITEM
COOK	COOKIES
DUCK	DUCK ITEM
EGDS	EGG ITEM
FISH	FISH ITEM
FRUT	FRUIT
GLTN	GELATIN ITEM
GRMY	GERMAN ITEM
GRVY	GRAVIES
HTAP	HOT APPETIZER
HTBV	HOT BEVERAGE
ICEY	ICE CREAM/YOGURT
ITAL	ITALIAN ITEM
LAMB	LAMB ITEM
MEXI	MEXICAN ITEM
MISC	MISCELLANEOUS
MSMN	MISC MAINITEMS
MSSI	MISC SIDE ITEMS
MSTP	MISCELLANEOUS TOPPINGS
PDDG	PUDDING
PIEC	CREAM PIE/CUSTARD/MISC
PIEF	FRUIT/NUT PIE
PORK	PORK ITEM
PSCH	PASTA WITH CHEESE
PSMT	PASTA WITH MEAT OR SEAFOOD
PSTA	PASTA ITEM
RCDH	RICE ITEM
RELH	RELISHES
SFDH	SEAFOOD ITEM
SLAD	SALAD
SLDR	SALAD DRESSINGS

PRODTYPE.dbf
(Reference Table - Contents)
(Continued)

PRODUCT	PRODUCT DESCRIPTION
CODE	
SNDW	SANDWICH
SOUT	SOUTHERN ITEM
SPBF	BEEF BASED SOUP
SPCK	CHICKEN BASED SOUP
SPCR	CREAM OF (SOUPS)
SPPK	PORK BASED SOUP
SPSF	SEAFOOD BASED SOUPS
SPVG	VEGETABLE SOUP
SWSA	SWEET SAUCES/TOPPINGS
TRKY	TURKEY ITEM
VEAL	VEAL ITEM
VEGP	VEGETABLE ITEM (POTATOES)
VEGT	VEGETABLE ITEM
WSIN	WEST INDIAN ITEM

PROTOMEN.dbf

Note: This table will be used as a Template for the Menu files created by the user.				
FIELD	TYPE	WIDTH	DEC.	DESCRIPTION OF FIELD
DAY	Numeric	2		Day (#) of Menu Period
MEAL	Numeric	1		Meal (#) of the Day
RECP NUM	Characte	6		AFRS Recipe Number
SEL RATE	Numeric	4	1	Selection Rate
PORTIONS	Numeric	6	0	# of portions to prepare/menu item
A LABOR	Numeric	10	2	Labor (min) req. to prepare menu
A COST	Numeric	10	2	Total cost/recipe item/# portions
A DRY	Numeric	10	2	Total dry stg req./recipe item/#
A CHILL	Numeric	10	2	Total chill stg req./recipe item/#prtns
A FRZR	Numeric	10	2	Total frzr stg req./recipe item/#prtns
NO OVENS	Numeric	5	1	Total # ovens req./recipe item/#prtns
KETTLE	Logical	1		A Flag indicating eq. is used in recipe.
FRYERS	Logical	1		A Flag indicating eq. is used in recipe.
GRIDDLE	Logical	1		A Flag indicating eq. is used in recipe.
MIXERS	Logical	1		A Flag indicating eq. is used in recipe.
		6/8/95		

TEMPX01.dbf & TEMPX02.dbf

Temporary Tables Used in the Optimization Process.				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
DAY	Character	2		Day in the Menu Cycle
MEAL	Character	1		Meal in the Day of the Menu Cycle
RECP_NUM	Character	6		A_item Recipe No.
SEL_RATE	Numeric	4	1	Selection Rate for Recipe #
PORTIONS	Numeric	6	0	No. Portions to Prepare Req.
A_COST	Numeric	10	2	Cost for Menu item/scaled to # of Portions
A_LABOR	Numeric	10	2	Labor Required/Menu item/scaled to # of
A_CHILL	Numeric	10	2	Chill Space Required/scaled to # of Portions
A_DRY	Numeric	10	2	Dry Storage Space Required/scaled to # of
A_FRZR	Numeric	10	2	Freezer Space Required/scaled to # of
A_OBJ	Numeric	10	2	Weighted objective (A_item)
C_OBJ	Numeric	10	2	Weighted objective (Conv. Food)
PROD_CODE	Character	4		Product Type Code
CAT_CODE	Character	2		Category Code
ITEMNUM	Character	10		Convenience Food Item Number
DIFF_OBJ	Numeric	10	2	(C_OBJ) - (A_OBJ)
RECP_ITEM	Character	10		A_item Recipe #\Conv Food Item #
NO_OVENS	Numeric	5	1	Total # ovens req./recipe item/#prtns
KETTLE	Logical	1		A Flag indicating eq. is used in recipe/item.
FRYERS	Logical	1		A Flag indicating eq. is used in recipe/item.
GRIDDLE	Logical	1		A Flag indicating eq. is used in recipe/item.
MIXERS	Logical	1		A Flag indicating eq. is used in recipe/item.

TEMPSUMM.dbf

Temporary Table Used To Generate Report Comparing Cost, Labor, and				
FIELD NAME	TYPE	WIDTH	DEC.	DESCRIPTION OF FIELD
A_COST	Numeric	10	2	Total Cost/Meal - A-Ration Menu
C_COST	Numeric	10	2	Total Cost/Meal - Subst. Menu
A_LABOR	Numeric	10	2	Total Labor Req/Meal - A-Ration Menu
C_LABOR	Numeric	10	2	Total Labor Req/Meal - Subst. Menu
A_DRY	Numeric	10	2	Total Dry Storage Req/Meal - A-Ration Menu
C_DRY	Numeric	10	2	Total Dry Storage Req/Meal - Subst. Menu
A_CHILL	Numeric	10	2	Total Chilled Storage Req/Meal-A-Ration Menu
C_CHILL	Numeric	10	2	Total Chilled Storage Req/Meal - Subst. Menu
A_FRZR	Numeric	10	2	Total Frzr Storage Req/Meal - A-Ration Menu
C_FRZR	Numeric	10	2	Total Frzr Storage Req/Meal - Subst. Menu
DAY	Character	2		Day in the Menu Cycle
MEAL	Character	1		Meal w/in Day
A_OVENS	Numeric	16	1	# ovens req./A-Ration recipe item
C_OVENS	Numeric	16	1	# ovens req./Convenience food item
A_KETTLE	Logical	1		A Flag indicating eq. is used in A-Ration recipe
C_KETTLE	Logical	1		A Flag indicating eq. is used in Conv. Food item
A_FRYERS	Logical	1		A Flag indicating eq. is used in A-Ration recipe
C_FRYERS	Logical	1		A Flag indicating eq. is used in Conv. Food item
A_GRIDDLE	Logical	1		A Flag indicating eq. is used in A-Ration recipe
C_GRIDDLE	Logical	1		A Flag indicating eq. is used in Conv. Food item
A_MIXERS	Logical	1		A Flag indicating eq. is used in A-Ration recipe
C_MIXERS	Logical	1		A Flag indicating eq. is used in Conv. Food item
		6/8/95		

RATES.dbf

Table Containing Default Values of the Attendance				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
TYPE	Character	4		Rate Type
A_RATE1	Numeric	4	1	Attendance Rate (%) - Breakfast
A_RATE2	Numeric	4	1	Attendance Rate (%) - Lunch
A_RATE3	Numeric	4	1	Attendance Rate (%) - Dinner
A_RATE4	Numeric	4	1	Attendance Rate (%) - Mid Rations
A_RATEW1	Numeric	4	1	Attendance Rate (%) - Bkfst (Wknd)
A_RATEW2	Numeric	4	1	Attendance Rate (%) - Lunch (WE)
A_RATEW3	Numeric	4	1	Attendance Rate (%) - Dinner (WE)
A_RATEW4	Numeric	4	1	Attendance Rate (%) - Mid Rats
2 Records				
6/8/95				

RATES.dbf (Reference Table - Contents)

	(Record #1)	(Record #2)
TYPE	SEA	PORT
A_RATE1	73.3	40.0
A_RATE2	91.7	83.3
A_RATE3	73.3	40.0
A_RATE4	43.3	0
A_RATEW1	73.3	28.3
A_RATEW2	91.7	36.7
A_RATEW3	73.3	36.7
A_RATEW4	43.3	0

MISC_STR.dbf

Table Containing the weekly storage requirements/100 portions				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
SPD CST P	Numeric	8	2	Cost/100 portions - Speedline (in Port)
SPD CST S	Numeric	8	2	Cost/100 portions - Speedline (at Sea)
MSPD C P	Numeric	8	2	Cold Storage/100 portions - Speedline (in Port)
MSPD C S	Numeric	8	2	Cold Storage/100 portions - Speedline (at Sea)
MSPD D P	Numeric	8	2	Dry Storage/100 portions - Speedline (in Port)
MSPD D S	Numeric	8	2	Dry Storage/100 portions - Speedline (at Sea)
MSPD F P	Numeric	8	2	Frzr Storage/100 portions- Speedline (in Port)
MSPD F S	Numeric	8	2	Frzr Storage/100 portions - Speedline (at Sea)
SLD CST P	Numeric	8	2	Cost/100 portions - Salad (in Port)
SLD CST S	Numeric	8	2	Cost/100 portions - Salad (at Sea)
MSLD C P	Numeric	8	2	Cold Storage/100 portions - Salad (in Port)
MSLD C S	Numeric	8	2	Cold Storage/100 portions - Salad (at Sea)
MSLD D P	Numeric	8	2	Dry Storage/100 portions - Salad (in Port)
MSLD D S	Numeric	8	2	Dry Storage/100 portions - Salad (at Sea)
MSLD F P	Numeric	8	2	Frzr Storage/100 portions - Salad (in Port)
MSLD F S	Numeric	8	2	Frzr Storage/100 portions- Salad (at Sea)
XTRA CST P	Numeric	8	2	Cost/100 portions-Extra Items (in Port)
XTRA CST S	Numeric	8	2	Cost/100 portions-Extra Items (at Sea)
MXTRA C P	Numeric	8	2	Cold Storage/100 portions-Extra Items (in Port)
MXTRA C S	Numeric	8	2	Cold Storage/100 portions-Extra Items (at Sea)
MXTRA D P	Numeric	8	2	Dry Storage/100 portions - Extra Items (in Port)
MXTRA D S	Numeric	8	2	Dry Storage/100 portions - Extra Items (at Sea)
MXTRA F P	Numeric	8	2	Frzr Storage/100 portions - Extra Items (in Port)
MXTRA F S	Numeric	8	2	Frzr Storage/100 portions - Extra Items (in Port)
MXTRA W P	Numeric	8	2	Water Rqmnts/100 portions - Extra Items (in Port)
MXTRA W S	Numeric	8	2	Water Rqmnts/100 portions - Extra Items (at Sea)
1 Record				
6/8/95				

MISC_STR.dbf
(Reference Table - Contents)

Type	(Record
SPD_CST_P	560.01
SPD_CST_S	878.86
MSPD_C_P	16.6
MSPD_C_S	27.71
MSPD_D_P	6.31
MSPD_D_S	8.3
MSPD_F_P	17.9
MSPD_F_S	27.55
MSPD_W_P	.17
MSPD_W_S	.26
SLD_CST_P	688.04
SLD_CST_S	1036.64
MSLD_C_P	36.79
MSLD_C_S	55.45
MSLD_D_P	16.43
MSLD_D_S	24.6
MSLD_F_P	.03
MSLD_F_S	.04
MSLD_W_P	1.45
MSLD_W_S	2.18
XTRA_CST_P	638.56
XTRA_CST_S	1055.42
MXTRA_C_P	9.47
MXTRA_C_S	16.95
MXTRA_D_P	19.44
MXTRA_D_S	34.98
MXTRA_F_P	5.53
MXTRA_F_S	7.56
MXTRA_W_P	7.6
MXTRA_W_S	11.84

REC CTGR.dbf

Category Codes for menu items				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
CAT_CODE	Character	2	Asc	Category Code
CAT_DESC	Character	15	Asc	Category Description
SEL_RATE	Numeric	4	1	Selection Rate (Default)
10 Records	6/8/95			

REC_CTGR.dbf
(Reference Table - Contents)

	CATEGORY DESCRIPTION	SEL_RATE
AP	APPETIZER	51.8
BE	BREAKFAST ENTREES	57.1
BR	BRDS/BISCUITS/ROLLS/MUFFINS	80.0
BS	BREAKFAST SIDE ITEMS	47.8
BV	BEVERAGES	64.6
DS	DESSERT	70.9
EN	ENTREE	62.7
MS	MISCELLANEOUS	25.0
SC	SAUCES	49.6
SI	SIDE ITEM	71.2

The default value for the selection rate for the Salad Bar is 75.6%.

MEAL_NAME.dbf

Meal Names - Reference Table				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
MEAL_NO	Character	1		Meal Code No.
MEAL_NAME	Character	15		Meal Name
4 Records	6/8/95			

MEAL_NAME.dbf
(Reference Table - Contents)

	CATEGORY DESCRIPTION
MEAL_NO	MEAL_NAME
1	BREAKFAST
2	LUNCH
3	DINNER
4	MIDRATS

SHIPS.dbf

Ship Information				
FIELD	TYPE	WIDTH	DEC.	DESCRIPTION OF FIELD
NAME				
SHIP_NAME	Character	30		Name of the Ship
SHP_CLAS	Character	6		Classification of ship
TYP_CODE	Character	7		Type of ship within Classification
CLS_CODE	Character	6		Class of ship within type seleted
HULL_NO	Character	10		Hull Number of Ship
NO_OFF	Numeric	3		Max. # of officers in the ship's
NO_CPO	Numeric	3		Max. # of chief petty officers in the ship's
NO_ENL	Numeric	4		Max. # of enlisted personnel in the ship's
WARD	Logical	1		Indicates if the ship has a wardroom
CHIEFS	Logical	1		Indicates if the ship has a chiefs' mess
GENERAL	Logical	1		Indicates if the ship has a general mess
NO_OVENS	Numeric	5	2	# of ovens used in the general mess, to
NO_KETTLE	Numeric	5	2	# of steam kettles used in the general
NO_FRYERS	Numeric	5	2	# of fryers used in the general mess, to
NO_GRIDDLE	Numeric	5	2	# of griddles used in the general mess, to
NO_MIXERS	Numeric	5	2	# of mixers used in the general mess, to
DRY_STOR	Numeric	8	2	Amount of dry storage available for the
CHILL_STOR	Numeric	8	2	Amount of chilled space available for the
FRZR_STOR	Numeric	8	2	Amount of freezer space available for the
COMMENTS	Character	35		Used for additional comments
62 Records				
6/8/95				

CLASSIF.dbf

This table is used to define a Ship's Classification.				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
SHP_CLAS	Character	6		Classification Code
SHP_DESC	Character	40		Classification Description
7 Records				
6/8/95				

SHIPTYPE.dbf

This table contains Ship Types (w/in a Classification).				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
SHP_CLAS	Character	6		Classification Code
TYP_CODE	Character	7		Type Code
TYP_DESC	Character	40		Type Description
136 Records				
6/8/95				

SHIPCLAS.dbf

This table contains Classes of Ships (w/in a Ship Type).				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
TYP_CODE	Character	7		Type Code
CLS_CODE	Character	6		Class Code
CLS_DESC	Character	40		Class Description
76 Records				
6/8/95				

CLASSIF.dbf - Contents

Ship Classification	Description
AUX	AUXILIARY SHIP
AWC	AMPHIBIOUS WARFARE CRAFT
AWS	AMPHIBIOUS WARFARE SHIP
CS	COMBATANT SHIP
MWS	MINE WARFARE SHIP
PC	PATROL CRAFT
SC	SERVICE CRAFT

SHIPTYPE.dbf - Contents

Ship Class	Type Code	Type Code Description
AUX	AD	DESTROYER TENDER
AUX	AE	AMMUNITION SHIP
AUX	AFS	COMBAT STORE SHIP
AUX	AG	MISCELLANEOUS
AUX	AGDS	DEEP SUBMERGENCE SUPPORT SHIP
AUX	AGEH	HYDROFOIL RESEARCH SHIP
AUX	AGF	MISCELLANEOUS COMMAND SHIP
AUX	AGM	MISSILE RANGE INSTRUMENTATION SHIP
AUX	AGOR	OCEANOGRAPHIC RESEARCH SHIP
AUX	AGP	PATROL CRAFT TENDER
AUX	AGSS	AUXILIARY RESEARCH SUBMARINE
AUX	AH	HOSPITAL SHIP
AUX	AK	CARGO SHIP
AUX	AKR	VEHICLE CARGO SHIP
AUX	ALS	AUXILIARY LIGHTER
AUX	AO	OILER
AUX	AOE	FAST COMBAT SUPPORT SHIP
AUX	AOG	GASOLINE TANKER
AUX	AOR	REPLENISHMENT OILER
AUX	AOT	TRANSPORT OILER
AUX	AP	TRANSPORT
AUX	APB	SELF PROPELLED BARRACKS SHIP
AUX	AR	REPAIR SHIP
AUX	ARC	CABLE REPAIRING SHIP
AUX	ARL	REPAIR SHIP, SMALL
AUX	ARS	SALVAGE SHIP
AUX	AS	SUBMARINE TENDER
AUX	ASR	SUBMARINE RESCUE SHIP
AUX	ATA	AUXILIARY OCEAN TUG
AUX	ATF	FLEET OCEAN TUG
AUX	ATS	SALVAGE AND RESCUE SHIP
AUX	AVM	GUIDED MISSILE SHIP
AUX	AVT	AUXILIARY AIRCRAFT LANDING TRAINING SHIP

SHIPTYPE.dbf - Contents (Con't)

Ship Class	Type Code	Type Code Description
AUX	AGOS	OCEAN SURVEILLANCE SHIP
AWC	LCAC	LANDING CRAFT, AIR CUSHION
AWC	LCM	LANDING CRAFT, MECHANIZED
AWC	LCPL	LANDING CRAFT, PERSONNEL, LARGE
AWC	LCU	LANDING CRAFT, UTILITY
AWC	LCVP	LANDING CRAFT, VEHICLE, PERSONNEL
AWC	LSSC	LIGHT SEAL SUPPORT CRAFT
AWC	LWT	AMPHIBIOUS WARPING TUG
AWC	MSSC	MEDIUM SEAL SUPPORT CRAFT
AWC	SDV	SWIMMER DELIVERY CRAFT
AWC	SLWT	SIDE LOADING WARPING TUG
AWC	SWCL	SPECIAL WARFARE CRAFT, LIGHT
AWC	SWCM	SPECIAL WARFARE CRAFT, MEDIUM
AWS	LCC	AMPHIBIOUS COMMAND SHIP
AWS	LHA/LHD	AMPHIBIOUS ASSAULT SHIP
AWS	LKA	AMPHIBIOUS CARGO SHIP
AWS	LPD	AMPHIBIOUS TRANSPORT DOCK
AWS	LSD	DOCK LANDING SHIP
AWS	LSV	LOGISTIC SUPPORT VESSEL (ARMY)
AWS	LST	TANK LANDING SHIP
AWS	LPH	AMPHIBIOUS ASSAULT SHIP (HELICOPTER)
CS	CV	AIRCRAFT CARRIER
CS	CVN	AIRCRAFT CARRIER (NUCLEAR PROP)
CS	CG	GUIDED MISSILE CRUISER
CS	CGN	GUIDED MISSILE CRUISER (NUCLEAR PROP)
CS	DD	DESTROYER
CS	DDG	GUIDED MISSILE DESTROYER
CS	FF	FRIGATE
CS	FFG	GUIDED MISSILE FRIGATE
CS	PHM	PATROL COMBATANT MISSILE (HYDROFOIL)
CS	SSBN	BALLISTIC MISSILE SUB (NUCLEAR PROP)
CS	SSN	ATTACK SUBMARINE (NUCLEAR PROP)
CS	SSAG	AUXILIARY SUBMARINE
MWS	MCM	MINE COUNTERMEASURES SHIP
MWS	MHC	MINEHUNTER COASTAL
MWS	MSO	MINESWEEPER OCEAN
MWS	MSB/MSD	MINESWEEPING BOATS/DRONES
PC	ATC	MINI-ARMORED TROOP CARRIER
PC	PB(C)	PATROL BOAT (COASTAL)
PC	PBR	RIVER PATROL BOAT
PC	PC	PATROL CRAFT
PC	PCF	PATROL CRAFT' (FAST)
PC	PCC	PATROL CRAFT (COASTAL)
SC	AFDB	LG AUX FLOATING DRY DOCK (NON SELF-PROP)
SC	AFDL	SML AUX FLTG DRY DOCK (NON SELF-PROP)
SC	AFDM	MED AUX FLTG DRY DOCK (NON SELF-PROP)
SC	APL	BARRACKS CRAFT (NON SELF-PROP)

SHIPTYPE.dbf - Contents (Con't)

Ship Class	Type Code	Type Code Description
SC	ARD	AUX REPAIR DRY DOCK (NON SELF-PROP)
SC	ARDM	MED AUX REPAIR DRY DOCK (NON SELF-PROP)
SC	DSRV	DEEP SUBMURGENC RESCUE VEHICLE
SC	DSV	DEEP SUBMURGENCE VEHICLE
SC	HSB	HARBOUR SECURITY BOATS
SC	IX	UNCLASSIFIED MISCELLANEOUS
SC	NR	SUBMERSIBLE RESEARCH VEHICLE
SC	YAG	MISC. AUXILIARY (SELF-PROPELLED)
SC	YC	OPEN LIGHTER (NON SELF-PROPELLED)
SC	YCF	CAR FLOAT (NON SELF-PROPELLED)
SC	YCV	AIRCRAFT TRANSPORTATION LIGHTER (NSP)
SC	YD	FLOATING CRANE (NON SELF PROP)
SC	YDT	DIVING TENDER (NON SELF PROPELLED)
SC	YF	COVERED LIGHTER (SELF-PROPELLED)
SC	YFB	FERRY BOAT OR LAUNCH (SELF-PROPELLED)
SC	YFD	YARD FLOATING DRY DOCK (NON SELF PROP)
SC	YFN	COVERED LIGHTER (NON SELF PROP)
SC	YFNB	LG COVERED LIGHTER (NON SELF PROP)
SC	YFND	DRY DOCK COMPANION CRFT (NON SELF PROP)
SC	YFNX	LIGHTER (SPECIAL PURPOSE) (NON SELF PROP)
SC	YFP	FLOATING POWER BARGE (NON SELF PROP)
SC	YFR	REFRIGERATED COVERED LIGHTER (SELF-PROP)
SC	YFRN	REFRIG. COVERED LIGHTER (NON SELF PROP)
SC	YFRT	COVERED LGHTR (RANGE TENDER) (SELF-PROP)
SC	YFU	HARBOR UTILITY CRAFT (SELF-PROPELLED)
SC	YG	GARBAGE LIGHTER (SELF-PROPELLED)
SC	YGN	GARBAGE LIGHTER (NON SELF PROP)
SC	YHLC	SALVAGE LIFT CRAFT, MED (NON SELF PROP)
SC	YM	DREDGE (SELF-PROPELLED)
SC	YMLC	SALVAGE LIFT CRAFT, MED (NON SELF PROP)
SC	YNG	GATE CRAFT (NON SELF PROP)
SC	YO	FUEL OIL BARGE (SELF-PROPELLED)
SC	YOG	GASOLINE BARGE (SELF-PROPELLED)
SC	YOGN	GASOLINE BARGE (NON SELF PROP)
SC	YON	FUEL OIL BARGE (NON SELF PROP)
SC	YOS	OIL STORAGE BARGE (NON SELF PROP)
SC	YP	PATROL CRAFT (SELF-PROPELLED)
SC	YPD	FLOATING PILE DRIVER (NON SELF PROP)
SC	YR	FLOATING WORKSHIP (NON SELF PROP)
SC	YRB	REPAIR AND BERTHING BARGE (NSP)
SC	YRBM	REPAIR, BERTHING AND MESSING BARGE (NSP)
SC	YRDH	FLOATING DRY DOCK WORKSHOP (HULL) (NSP)
SC	YRDM	FLOATING DRY DOCK WORKSHOP (MC) (NSP)
SC	YRR	RADIOLOGICAL REPAIR BARGE (NSP)
SC	YRST	SALVAGE CRAFT TENDER (NON SELF-PROP)

SHIPTYPE.dbf - Contents (Con't)

Ship Class	Type Code	Type Code Description
SC	YSD	SEAPLANE WRECKING DERRICK (SELF-PROP)
SC	YSR	SLUDGE REMOVAL BARGE (NON SELF-PROP)
SC	YTB	LARGE HARBOUR TUG
SC	YTL	SMALL HARBOUR TUG
SC	YTM	MEDIUM HARBOUR TUG
SC	YW	WATER BARGE (SELF-PROPELLED)
SC	YWN	WATER BARGE (NON SELF-PROP)

SHIPCLAS.dbf - Contents

Type Code	Class Code	Class Code Description
AD	SG	SAMUEL GOMPERS CLASS
AD	YW	YELLOWSTONE CLASS
AE	SR	SURIBACHI CLASS
AE	NT	NITRO CLASS
AE	KIL	KILAUEA CLASS
AE	AS	AMMUNITION SHIP
AFS	MARS	MARS CLASS
AFS	CSS	COMBAT STORES SHIP
AG	SS	SURVEYING SHIPS
AG	NRS	NAVIGATION RESEARCH SHIP
AGF	RALAU	RALEIGH AND AUSTIN CLASS
AGM	MRIS	MISSILE RANGE INSTRUMENTN. SHIPS (TYPE)
AGOR	ORS	OCEANOGRAPHIC RESEARCH SHIPS (TYPE)
AGOS	OSS	OCEAN SURVEILLANCE SHIPS
AGSS	DOLPH	DOLPHIN CLASS
AH	HS	HOSPITAL SHIPS
AK	FBMSS	FLEET BALLISTIC MISSILE SUPPORT SHIP
AK	MPS	MARITIME PREPOSITIONING SHIPS (MPS)
AK	LASH	LASH (TYPE)
AK	FRTR	FREIGHTERS (TYPE)
AKR	FSS	FAST SEALIFT SHIPS (TYPE)
AO	HJK	HENRY J. KAISER CLASS
AO	TNKR	TANKERS (TYPE)
AO	CIMAR	CIMARRON CLASS
AOE	SACR	SACRAMENTO CLASS
AOE	SUPPLY	SUPPLY CLASS
AOR	WICH	WICHITA CLASS
AR	CRS	CABLE REPAIR SHIPS
ARS	BOL	BOLSTER CLASS
ARS	SAFE	SAFEGUARD CLASS
AS	HUNLEY	HUNLEY CLASS
AS	SIMON	SIMON LAKE CLASS
AS	SPEAR	SPEAR CLASS

SHIPCLAS.dbf - Contents (Con't)

Type Code	Class Code	Class Code Description
AS	EMORY	EMORY S LAND CLASS
ASR	CHANT	CHANTICLEER CLASS
ASR	PIGEON	PIGEON CLASS
ATF	POWH	POWHATAN CLASS
ATS	EDEN	EDENTON CLASS
AVT	ASS	AVIATION SUPPORT SHIPS
CG	TICON	TICONDEROGA CLASS
CG	LEAHY	LEAHY CLASS
CG	BELK	BELKNAP CLASS
CGN	BAIN	BAINBRIDGE CLASS
CGN	TRUX	TRUXTON CLASS
CGN	CALIF	CALIFORNIA CLASS
CGN	VIRG	VIRGINIA CLASS
CV	FORR	FORRESTAL CLASS
CV	KITTY	KITTY HAWK CLASS
CV	JFK	JOHN F KENNEDY CLASS
CVN	ENTER	ENTERPRISE CLASS
CVN	NIMITZ	NIMITZ CLASS
DD	SPRU	SPRUANCE CLASS
DDG	ARLE	ARLEIGH BURKE CLASS
DDG	KIDD	KIDD CLASS
FF	KNOX	KNOX CLASS
FFG	OLIVER	OLIVER HAZARD PERRY CLASS
LCC	BLUE	BLUE RIDGE CLASS
LHA	TARA	TARAWA CLASS
LHD	WASP	WASP CLASS
LPD	AUSTIN	AUSTIN CLASS
LPH	IWO	IWO JIMA CLASS
LSD	ANCHOR	ANCHORAGE CLASS
LSD	WIC	WHIDBEY ISLAND CLASS
LST	NEWPRT	NEWPORT CLASS
MCM	AVENGR	AVENGER CLASS
MHC	OSPR	OSPREY CLASS
MSO	AGRESS	AGRESSIVE CLASS
PC	CYCL	CYCLONE CLASS
SSBN	JAMES	JAMES MADISON CLASS
SSBN	BENJ	BENJAMIN FRANKLIN CLASS
SSBN	OHIO	OHIO CLASS
SSN	BENF	BENJAMIN FRANKLIN CLASS
SSN	SEAW	SEAWOLF CLASS
SSN	STURG	STURGEON CLASS
SSN	NARW	NARWHAL CLASS
SSN	LOSANG	LOS ANGELES CLASS

STOR_TYP.dbf

This table contains Storage Codes.				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
STOR_CODE	Character	1		Storage Code
STOR_DESC	Character	10		Storage Description
4 Records				
6/8/95				

STOR_TYP.dbf
(Reference Table - Contents)

Storage Codes	
STOR_CODE	STOR_DESC
d	Dry
c	Chilled
f	Freezer
w	Water

SUB_ITEM.dbf

AFRS - Convenience Foods Assoc. Table				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
RECP_NUM	Character	6		AFRS Recipe Number
ITEMNUM	Character	10		Convenience Food Item Number
11876 Records	6/8/95			

TEMPLOG.dbf

Logistical Info for Selected Menu (This is a Temporary File)				
FIELD NAME	TYPE	WIDTH	DEC.	DESCRIPTION OF FIELD
FSC_MONTH	Character	2		Fiscal Month for Listed Price
FSC_YEAR	Character	2		Fiscal Year for Listed Price
ACTION	Character	1		(?Indicates changes,& ?)
INDEX_NO	Character	5		A sequence # (alphabetical position)
NAVY_CODE	Character	3		Navy Code (FIC)
NSN	Character	13		National Stock Number
STORAGE	Character	1		Type of Storage (ex. f - freezer)
PERISHABLE	Character	2		P - Perishable SP - Semi-perishible
DESCRIPTN	Character	50		Name of Item (Ingredient)
UNIT_ISSUE	Character	2		Unit of Issue (LB, CN, etc)
CON_FACTOR	Numeric	7	3	Conversion Factor (* for bulk units to lbs)
CONFACNOTE	Character	2		Conversion Factor Note (how to use
REQ_NETLBS	Numeric	10	4	Required Net lbs/menu (used in model)
REQ_CASES	Numeric	10	4	Required Net Cases/menu (used in model)
REQ_UNITS	Numeric	10	4	Required Units/menu (used in model)
REQ_VOL	Numeric	6	2	Required Vol/storage type/menu
REQ_COST	Numeric	8	2	Required Cost/menu (used in model)
MIN_CASE	Numeric	10		Min. # Cases/menu (use in model)
MIN_COST	Numeric	8	2	Min. Cost/menu (used in model)
MIN_VOL	Numeric	6	2	Min. Storage/storage type/menu
MIN_WT	Numeric	10	4	Min. Gr. Wt/menu (used in model)
USAGE_MGT	Character	4		Usage Management Codes (for Restrictions)
ACQ_ADVICE	Character	2		Acquisition Codes (for Contracting use)
PACK_UNIT	Character	2		Package Units
UNITS_CASE	Numeric	4		No. of units/case
EXP	Numeric	3		
CASES_PALT	Numeric	3		Cases/pallet
CASE_G_LBS	Numeric	3		Gross lbs/case
CAS_NETLBS	Numeric	3		Net lbs/case
CASE_CU_FT	Numeric	4	2	Cubic Feet of Case
C_LENGTH	Numeric	4	1	Length of Case
C_WIDTH	Numeric	4	1	Width of Case
C_HEIGHT	Numeric	4	1	Height of Case
UNIT_PRICE	Numeric	6	2	Price/unit
PRICEMONTH	Character	2		Month (of current price list)
PRICEYEAR	Character	2		Year (of current price list)

ACQ_CODE.dbf

Acquisition Codes				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
ACQ_CODE	Character	1		Code
DESCRIPTN	Character	50		Description of code
9 Records	6/8/95			

ACQ_CODE.dbf - Acquisition Codes	
ACQ_ Code	Description
D	DOD integrated material
H	Direct delivery under a central contract.
I	Direct ordering from a central contract/schedule
L	Local purchase
R	Restricted Requisition-Govt. Furnished Materiel
V	Terminal Item (stocks not exhausted)
W	Restricted Requisitioning-Special instrns apply.
Y	Terminal item (stocks exhausted)

USE_CODE.dbf

Usage Management Codes				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
USG_CODE	Character	1		Code
DESCRIPTN	Character	70		Description of code
20 Records	6/8/95			

USG_CODE.dbf - Usage Management Codes	
Usage Mgmt Code	Description
A	Domestic Use
B	Overseas and Afloat Use
C	Controlled Item
D	Use in B ration (std & med.) & auth resrv. stkg
E	Test item
F	TPK-2 item (protection under severe hndlg/strg conditions.reqd.)
G	Box lunches, flight feeding, carryout, modular/small/isolated units
I	Submarines and ships 99 or less
I	Air Force ONLY
J	Cntrl processing facilities, milk plnts, dining fac. feeding >=1000
K	Army ONLY
L	Use when carbonated beverage dispensers unavailable.
M	Afloat use
O	Marines require HQ approval; NOT auth. for Navy; Army/Air Force OK
P	Submarines ONLY
R	Short shelf life; limited to domestic/SELECTED overseas locations
S	NO restrictions for Navy SHORE facilities or for Other Services
T	Special Mgmnt attention to exhaust stocks at all levels.
X	Ration component procured SOLELY by DPSC (composite food pkgs)

PROG_ERR.dbf

This table contains Program Errors				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
NSN	Character	13		NSN Number
DESCRIPTN	Character	50		Description of NSN Item
RECP_NUM	Character	6		Recipe Number
ITEM_NAME	Character	40		Item Name
6/8/95				

ERROR.dbf

This table contains Error Messages that are found in the system.				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
ERR_ID	Character	9		Code indicating the Error Message to display
SCREEN_NAM	Character	10		Screen where error may occur.
OBJ_DESC	Character	10		Object w/in the screen where error may occur.
ERR_MESSAGE	Character	40		Message displayed.
68 Records				
6/8/95				

Errors.dbf - This table contains all the error messages.			
Error_id	Screen	Obj_Desc	Error Message
	Name		
ADDCATGRY	Convfood	m_manu/prd	You Must First Enter A Category, Then A Manufacturer.
ADDINGR	AddRecipe		You Must First Enter The Ingredients For This Recipe.
ADDMANUF	Convfood	m_name	You Must Enter The Manufacturer of This Product.
ADDPTYPE	Convfood	p_code	You Must First Enter The Product Type For This Product.
ADDQTY	AddRecipe	m_ret	Please Enter A Quantity And Cook_Unit For All Ingredients.
CASECOST	Convfood	m_calc	You Must Enter The Cost/Case For The Convenience Food Product.
CASESVGS	Convfood	m_calc	You Must Enter The Servings Per Case For The Convenience Food Product Based
CASEVOL	Convfood	m_calc	You Must Enter A Case Volume For The Convenience Food Product.
CASEWGT	Convfood	m_calc	You Must Enter The Net Weight/Case For The Convenience Food Product.
CLOSEMEN	Log_inq	do inquiry	Close Menu File Before Running A New Logistical Inquiry.
CODECHG	AddRecipe	m_disp	If You Changed The Category Code Or Product Type Of This Recipe, Re-
CODEEXST	Convfood	p_code	This Prefix Is Used To Identify Another Product Type. Please Select Another
COMPLETE	Log_inq	log_calc	Logistical Calculations are Complete. Select From The Report Options To View

Errors.dbf - This table contains all the error messages.			
Error_id	Screen	Obj_Desc	Error Message
	Name		
DBFFILE	Price	mfile	The File Used To Update Prices Must Be A FOXPROW Compatible (.dbf) File.
DBFSELE	Log_inq	menu	The File Selected Must Be A .dbf File Generated Through The Menu Screen.
DELMENU	Menu	m_name	Are You Sure You Want To Delete The Selected Menu File?
DELWARN	all	del_rec	Are You Sure You Want To Delete The Current Record?
DOCALC	Ingredient	m_ingr	If You Added, Deleted, Or Changed An Ingredient, Re-Calculate Cost/100.
ENTRUNIT	Convfood	m_calc	You Must Enter The Units of Measure.
FLEXIST	Menu	nw_file	This File Already Exists. Copy Over Existing File? Select 'No' To Save Changes
GROSSWT	Convfood	m_calc	You Must Enter The Gross Weight/Case For The Convenience Food Product.
GT100	Log_opt	sub_rate	The Substitution Rate Should Be Between 0 And 100 (%).
INFEAS	Log_opt		Problem Infeasible. Reduce Substitution Rate and re-run.
INVALID	Price	mfile	You Can Not Update The Logistical File (LOG_FILE.dbf) With A File Of The
LABRSEL	Convfood	m_calc	You Must Select The Type Labor Required To Prepare This Item.
LENGTH	NSN	nsn	The Length of The National Stock Number (NSN) Must Be 13 Digits.
LOGCALC	Log_inq	log_calc	The System is Calculating The Logistical Data. It May Take A Few Moments.
MANUEXST	Convfood	m_manu	This Manufacturer Already Exists.
MENUGEN	Log_opt	gen_menu	Processing Has Completed. Select From The Report Options To View Results.
MENUSELE	Menu	m_nwrec	You Must Select A Menu File Before Adding Recipes. Select From Menu Option
NEWMENU	Log_opt	gen_menu	The System is Generating a New Menu. It May Take A Few Moments. Please
NODIR	Menu	m_name	The Tables In This Directory Are Restricted. Please Select Again.
NONAME	Menu	m_name	You Must Give The Menu File A Name.
NORECORDS	all	search	No Records Found.
NORECP	Log Data	m_recip	There Are No Recipes Associated With This Item.
NOSUBST	AddRecipe	m_sub	The Database Contains No Convenience Food Substitutes For This Recipe.
NSMNUM	AddNSN	all	Enter An NSN First.
NWNAME	Log_inq	nw_file	You Must Enter A File Name.
PORTSIZE	Convfood	m_cost	You Must Enter A Portion Size For Both The Convenience Food Product And A
PORTUNIT	Convfood	m_calc	The AFRS Portion Must Be Compatible With The Convenience Food Product Or
PRESSAVE	Convfood	srch_on	You Must First Press The Save Button To Store New Recipe/Product.
PRFEXST	Convfood	m_prefix	This Prefix Is Used To Identify Another Manufacturer. Please Select Another
RECLENG	AddRecipe	mrecip	The Length of The Recipe Number Must Be Equal To 6.
RECNUM	AddRecipe	m_recipe	Enter A Recipe Number First.
RECPEXST	AddRecipe	m_recipe	This Recipe Number Already Exists. Enter New Number.
SAVECHG	Menu	addmenu	Did You Save Changes First?
SAVECOMP	log_opt	nw_fl5	Do you want to save comparison information between the A-ration and Substitute
SAVEINP	Log_inq	nw_file	Do You Wish To Save The Input Used In This Inquiry? If 'Yes,' Enter Filename
SAVELOG	Log_inq	nw_file	Do You Wish To Save The Output Logistical Data? If 'Yes', Enter Filename Now

Error_id	Screen	Obj_Desc	Error Message
	Name		
SAVEMEN	Menu	m_exit	A Menu File Is Open. Press 'Close Menu' Before Leaving Screen Or Creating A
SAVEMSG	Menu	m_close	Select From The Following Options.
SAVESUB	Log_opt	nw_fl2	Do You Wish To Save The New Menu File? If 'Yes,' Enter Filename Now.
SAVESUM	Lg_inq/opt	nw_file3	Do You Wish To Save The Input Menu File With Portions, Costs, Storage Reqmts,
SAVFILE	Menu	savemenu	Save Changes To Current Menu File? Select 'No' To Save Changes To New Menu
SAVMENU	Menu	savemenu	Enter A File Name For The Menu File You Created.
SELEFILE	Price	mfile	Enter Name of File Containing New Prices.
SELMENU	Log_inq	m_ship	Press The 'Select Menu File' Button To Locate a Menu File.
STORTYPE	Convfood	m_calc	You Must Select The Type Of Storage Required For This Convenience Food
SUBLIST	AddRecipe	m_sub	Identifying Convenience Food Substitutes May Take A Few Minutes. Please Wait.
TWOCHAR	Price	mfsc*	This Number Should Contain Two Digits.
TYPEEXST	Convfood	m_typ	This Product Type Already Exists.
UNITS	AddRecipe	m_cost	Cook_Units In The Ingredient File Are Incompatible With The Units Of Issue In
UPDATE	Price	mupdt	This Message Will Disappear When The Recipe Costs Have Been Updated. Press
UPDTRECP	Price	mupdt	This Process Could Take An Hour Or More. Continue?
WAITOPEN	Price	mfile	Please Wait Until The New Price File Has Been Opened.
WRNGCODE	Convfood	m_code	The Length of The Manufacturer's Product Code Must Not Be Longer Than 8.
WT10	Log_opt	Weights	Weight should be between 0 and 10
ZPREFIX	Recipe	mingr	Note that changes to the existing AFRS Recipes should be done by creating a new

MENU.dbf

This table is used to set up the menu options throughout the model.				
FIELD NAME	TYPE	WIDTH	DEC	DESCRIPTION OF FIELD
MENU	Character	10		Main Menu Identifier
MNU_PRMP	Character	18		Menu Prompt
BAR	Character	10		Menu Option (Identifies Bar)
BAR_PRMP	Character	40		Bar Prompts (w/in Menu Prompt)
BAR_CMND	Character	70		Program Executed When Selected
PRIVILEGES	Character	9		Not used at this time; could be used to restrict access.
149 Records				
6/8/95				

Menu.dbf - This table is used to set up the menu options throughout the system.

Menu	Menu Prompt	Bar	Bar Prompt	Bar Command
M0	File	M010	BLANK	
M0	File	M011	Exit	quit
M0	Help	M020	BLANK	
M0	Help	M021	Contents	do hlpcontnt
M0	Help	M022	Search For Help On...	_mst_hpsch
M1	File	M110	BLANK	
M1	File	M111	\-	
M1	File	M112	Exit	quit
M1	Recipes	M120	BLANK	do add_rec.pspr
M1	CFS	M130	BLANK	do convprod.pspr
M1	Menus	M140	BLANK	do menus.pspr
M1	Log_Data	M150	BLANK	do log.pspr
M1	Ship_Info	M160	BLANK	do ship.pspr
M1	Options	M170	BLANK	
M1	Options	M171	Run Logistical Inquiry (A-Rations)	do log_inq.pspr
M1	Options	M172	Run Optimization Model	do log_opt.pspr
M1	Options	M180	Update Prices	do price.pspr
M1	Help	M190	BLANK	
M1	Help	M191	Contents	do hlpcontnt
M1	Help	M192	Search For Help On...	_mst_hpsch
M1	Help	M193	About The CFLM...	do about.prg
M1END		M1zzz		
M2	File	M210	BLANK	
M2	File	M211	New	do add_new
M2	File	M212	Delete	do del_rec
M2	File	M213	Search	do srch_on
M2	File	M214	Exit	do myexit
M2	Print	M220	BLANK	
M2	Print	M221	Recipe Information	do rec_info
M2	Print	M222	Convenience Food Substitutes	do conv_sub
M2	Print	M223	Recipes w/Ingr. Not Avail. To Navy	do non_navy
M2	Help	M230	BLANK	
M2	Help	M231	Contents	do hlpcontnt
M2	Help	M232	Search For Help On...	_mst_hpsch
M2END		M2zzz		
M3	File	M310	BLANK	
M3	File	M311	Add	activate popup
M3	File	M312	Delete	activate popup ingr_lst
M3	File	M313	Exit	do mret
M3	Help	M320	BLANK	
M3	Help	M321	Contents	do hlpcontnt
M3	Help	M322	Search For Help On...	_mst_hpsch
M3END		M3zzz		

Menu	Menu Prompt	Bar	Bar Prompt	Bar Command
M4	File	M410	BLANK	
M4	File	M411	New	do add_new
M4	File	M412	Delete	do del_rec
M4	File	M413	Search	do srch_on
M4	File	M414	Exit	do myexit
M4	Print	M420	BLANK	
M4	Print	M421	Print Convenience Product Information	do cnv_info
M4	Help	M430	BLANK	
M4	Help	M431	Contents	do hlpcontnt
M4	Help	M432	Search For Help On...	_mst_hpsch
M4END		M4zzz		
M5	File	M510	BLANK	
M5	File	M511	Create Menu	do add_menu
M5	File	M512	Select Menu	do chg_menu
M5	File	M513	Delete Menu	do del_menu
M5	File	M514	Exit	do myexit
M5	Print	M520	BLANK	
M5	Print	M521	Print Current Menu	do menu_rpt
M5	Print	M521	Print Generic Salad Bar Menu	do salad
M5	Print	M521	Print Generic Speedline Menu	do speed
M5	Print	M521	Print Miscellaneous Items Menu	do misc
M5	Help	M530	BLANK	
M5	Help	M531	Contents	do hlpcontnt
M5	Help	M532	Search For Help On...	_mst_hpsch
M5END		M5zzz		
M6	File	M610	BLANK	
M6	File	M611	New	do add_new
M6	File	M611	Delete	do del_rec
M6	File	M611	Search	do srch_on
M6	File	M611	Exit	do myexit
M6	Print	M620	BLANK	
M6	Print	M621	Print Logistical Information for Item	do log_info
M6	Print	M622	Print List of Recipes W/This Ingredient	do log_recip
M6	Help	M630	BLANK	
M6	Help	M631	Contents	do hlpcontnt
M6	Help	M632	Search For Help On...	_mst_hpsch
M6END		M6zzz		

Menu	Menu Prompt	Bar	Bar Prompt	Bar Command
M7	File	M710	BLANK	
M7	File	M711	New	do add_new
M7	File	M712	Delete	do del_rec
M7	File	M713	Search	do srch_on
M7	File	M714	Exit	do myexit
M7	Print	M720	BLANK	
M7	Print	M721	Print Ship Information	do shp_info
M7	Help	M730	BLANK	
M7	Help	M731	Contents	do hlpcontnt
M7	Help	M732	Search For Help On...	mst_hpsch
M7END		M7zzz		
M8	File	M810	BLANK	
M8	File	M811	\-	
M8	File	M812	Exit	do myexit
M8	Inquiry	M820	BLANK	
M8	Inquiry	M821	New Inquiry	do new_inq
M8	Reports	M830	BLANK	
M8	Reports	M831	Print User Input	do input
M8	Reports	M832	Print Selected Menu	do menu_rpt
M8	Reports	M833	Print Menu w/Labor/Eq/Strg/Cost Req.	do afrs_rpt
M8	Reports	M834	Print Logistical Info w/List of Reqmts.	do log_rpt
M8	Reports	M835	Identify Items by Applic. Logistic Codes	do use_acq
M8	Reports	M836	Print List of Acquisition Advice Codes	do acq_rpt
M8	Reports	M837	Print List of Usage Management Codes	do usg_rpt
M8	Help	M840	BLANK	
M8	Help	M841	Contents	do hlpcontnt
M8	Help	M842	Search For Help On...	mst_hpsch
M8END		M8zzz		
M9	File	M910	BLANK	
M9	File	M911	\-	
M9	File	M912	Exit	do myexit
M9	Inquiry	M920	BLANK	
M9	Inquiry	M921	New Inquiry	do new_inq
M9	Reports	M930	BLANK	
M9	Reports	M931	Print User Input	do input
M9	Reports	M932	Print Input A-ration Menu	do menu_rpt
M9	Reports	M933	Print A_Ration Menu w/Logistics	do afrs_rpt
M9	Reports	M934	Print Optimized Menu w/Substitutions	do smenu_rpt
M9	Reports	M935	Print Optimized Menu w/Logistics	do slog_rpt
M9	Reports	M936	Print Items w/ List of All Substitutes	do alls_rpt
M9	Reports	M937	Print A_ration vs. Optimized	do compare
M9	Reports	M938	Print Equipment Comparison	do compare2
M9	Help	M940	BLANK	
M9	Help	M941	Contents	do hlpcontnt
M9	Help	M942	Search For Help On...	mst_hpsch
M9END		M9zzz		

Menu	Menu Prompt	Bar	Bar Prompt	Bar Command
M10	Help	MZ1010	BLANK	
M10	Help	MZ1011	Help	do hlpentnt
M10END	END	MZ10zzz		
M11	File	MZ1110	BLANK	
M11	File	MZ1111	\-	
M11	File	MZ1112	Exit	do myexit
M11	Help	MZ1120	BLANK	
M11	Help	MZ1121	Contents	do hlpentnt
M11	Help	MZ1122	Search For Help On...	_mst_hpsch
M12	File	MZ1210	BLANK	
M12	File	MZ1211	\-	
M12	File	MZ1212	Return	do myexit
M12END		ZZZZZ		

APPENDIX C

MISCELLANEOUS MENU ITEMS

Appendix C - Miscellaneous Menu Items

SALAD BAR MENU

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
1	2	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00902	APPLESAUCE, # 10	25
		A00922	PEACHES,QUARTERS/SLICES, # 10	25
		W02724	CRACKERS,OYSTER,INDIVIDUAL, 150/300 PG	25
1	3	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00926	PEARS,QUARTERS OR SLICES, # 10	25
		A00928	PINEAPPLE,CHUNKS, #10	25
2	2	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00902	APPLESAUCE, # 10	25
		A00922	PEACHES,QUARTERS/SLICES, # 10	25
		W02724	CRACKERS,OYSTER,INDIVIDUAL, 150/300 PG	25
2	3	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00926	PEARS,QUARTERS OR SLICES, # 10	25
		A00928	PINEAPPLE,CHUNKS, #10	25
3	2	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00902	APPLESAUCE, # 10	25
		A00922	PEACHES,QUARTERS/SLICES, # 10	25
		W02724	CRACKERS,OYSTER,INDIVIDUAL, 150/300 PG	25
3	3	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00926	PEARS,QUARTERS OR SLICES, # 10	25
		A00928	PINEAPPLE,CHUNKS, #10	25
4	2	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00902	APPLESAUCE, # 10	25
		A00922	PEACHES,QUARTERS/SLICES, # 10	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W02724	CRACKERS,OYSTER,INDIVIDUAL, 150/300 PG	25
4	3	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00926	PEARS,QUARTERS OR SLICES, # 10	25
		A00928	PINEAPPLE,CHUNKS, #10	25
5	2	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00902	APPLESAUCE, # 10	25
		A00922	PEACHES,QUARTERS/SLICES, # 10	25
		W02724	CRACKERS,OYSTER,INDIVIDUAL, 150/300 PG	25
5	3	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00926	PEARS,QUARTERS OR SLICES, # 10	25
		A00928	PINEAPPLE,CHUNKS, #10	25
6	2	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES,GREEN,UNPITTED	25
		MG0232	PEAS,CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS,PICKLED,JALAPENO, # 10	25
		MG0239	PICKLES,MIXED,SWEET,GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES,QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES,CUCUMBER,DILL,SLICED	25
		W02728	CRACKERS,SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING,7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00902	APPLESAUCE, # 10	25
		A00922	PEACHES,QUARTERS/SLICES, # 10	25
		W02724	CRACKERS,OYSTER,INDIVIDUAL, 150/300 PG	25
6	3	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY,STICKS OR STRIPS,FRESH (1/2")	25
		MG0221	CUCUMBER,PARED,SLICED,FRESH	25
		MG0228	ONIONS,CHOPPED,DRY	25

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES, GREEN, UNPITTED	25
		MG0232	PEAS, CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS, PICKLED, JALAPENO, # 10	25
		MG0239	PICKLES, MIXED, SWEET, GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES, QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES, CUCUMBER, DILL, SLICED	25
		W02728	CRACKERS, SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING, 7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00926	PEARS, QUARTERS OR SLICES, # 10	25
		A00928	PINEAPPLE, CHUNKS, #10	25
7	2	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY, STICKS OR STRIPS, FRESH (1/2")	25
		MG0221	CUCUMBER, PARED, SLICED, FRESH	25
		MG0228	ONIONS, CHOPPED, DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES, GREEN, UNPITTED	25
		MG0232	PEAS, CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS, PICKLED, JALAPENO, # 10	25
		MG0239	PICKLES, MIXED, SWEET, GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES, QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES, CUCUMBER, DILL, SLICED	25
		W02728	CRACKERS, SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2

DAY	MEAL	RECIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING, 7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00902	APPLESAUCE, # 10	25
		A00922	PEACHES, QUARTERS/SLICES, # 10	25
		W02724	CRACKERS, OYSTER, INDIVIDUAL, 150/300 PG	25
7	3	D01600	CROUTONS	25
		M04800	TOSSED VEGETABLE SALAD	71.2
		MG0211	CARROTS, FRESH, SLICES (1/4 ")	25
		MG0215	CELERY, STICKS OR STRIPS, FRESH (1/2")	25
		MG0221	CUCUMBER, PARED, SLICED, FRESH	25
		MG0228	ONIONS, CHOPPED, DRY	25
		MG0213	CAULIFLOWER, FRESH	25
		MG0226	OLIVES, GREEN, UNPITTED	25
		MG0232	PEAS, CHICK (GARBANZO BEANS)	25
		MG0234	PEPPERS, PICKLED, JALAPENO, # 10	25
		MG0239	PICKLES, MIXED, SWEET, GL DOMESTIC	25
		MG0240	RADISHES, FRESH	25
		MG0246	TOMATOES, QUARTERED, WEDGES	25
		W00902	ITALIAN DRESSING, 7/16 OZ (LO-CAL)	25
		MG0217	CHEESE, COTTAGE	25
		W02844	RANCH DRESSING, FAT FREE, INDIVIDUAL	25
		W01618	PICKLES, CUCUMBER, DILL, SLICED	25
		W02728	CRACKERS, SALAD, 16 OZ	25
		M02600	JELLIED FRUIT COCKTAIL SALAD	71.2
		M03700	PICKLED BEET AND ONION SALAD	71.2
		W00610	FRENCH DRESSING, 7/16 OZ, (LO-CAL)	25
		M05500	VINAIGRETTE DRESSING	25
		A01306	BANANAS, FRESH	25
		A01310	CANTALOUPE, FRESH, QUARTERED	25
		A01321	GRAPEFRUIT, FRESH	25
		A01330	ORANGES, FRESH	25
		A01302	APPLES, EATING, RED	25
		A01323	GRAPES, FRESH	25
		A00926	PEARS, QUARTERS OR SLICES, # 10	25
		A00928	PINEAPPLE, CHUNKS, #10	25

SPEEDLINE MENU

DAY	MEA	RECIPE	ITEM NAME	SELECTIO
		NUMBER		RATE
1	1	F01000	SCRAMBLED EGGS	71.2
		F00400	SOFT AND HARD COOKED EGGS	71.2
		L00202	GRILLED BACON	57.1
1	2	Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
		L16600	PIZZA (12 INCH FZ.,CRUST)	62.7
		N01201	GRILLED CHEESEBURGER	62.7
		N00102	BACON, LETTUCE & TOMATO SANDWICH	62.7
		W01628	POTATO CHIPS, 1 LB	25
1	3	N01200	GRILLED HAMBURGER	62.7
		Q03501	FRENCH FRIED ONION RINGS (FROZEN)	71.2
2	1	F01000	SCRAMBLED EGGS	71.2
		L08900	GRILLED SAUSAGE PATTIES	57.1
2	2	L08802	GRILLED FRANKFURTERS	62.7
		Q03501	FRENCH FRIED ONION RINGS (FROZEN)	71.2
		N00603	GRILLED CHEESE AND HAM SANDWICH	62.7
		W01628	POTATO CHIPS, 1 LB	25
2	3	Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
		N04102	CHILI DOG	62.7
		N01901	ITALIAN STYLE SUBMARINE	62.7
3	1	F00400	SOFT AND HARD COOKED EGGS	71.2
		F01000	SCRAMBLED EGGS	71.2
		L00202	GRILLED BACON	57.1
3	2	N00102	BACON, LETTUCE & TOMATO SANDWICH	62.7
		N00603	GRILLED CHEESE AND HAM SANDWICH	62.7
		Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
		N01200	GRILLED HAMBURGER	62.7
3	3	Q03501	FRENCH FRIED ONION RINGS (FROZEN)	71.2
		N01200	GRILLED HAMBURGER	62.7
		N01201	GRILLED CHEESEBURGER	62.7
		L03401	BURRITOS (BEEF & BEAN,FROZEN)	62.7
4	1	F01000	SCRAMBLED EGGS	71.2
		L08900	GRILLED SAUSAGE PATTIES	57.1
		Q04602	HASH BRN POT (FROZEN,SHREDDED, 3 OZ)	71.2
4	2	N01200	GRILLED HAMBURGER	62.7
		N01201	GRILLED CHEESEBURGER	62.7
		Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
		L16600	PIZZA (12 INCH FZ.,CRUST)	62.7
4	3	N00400	ROAST BEEF SANDWICH	62.7
		W01628	POTATO CHIPS, 1 LB	25
		N01200	GRILLED HAMBURGER	62.7
5	1	F00400	SOFT AND HARD COOKED EGGS	71.2

DAY	MEA	RECIPE	ITEM NAME	SELECTIO
		NUMBER		RATE
		F01000	SCRAMBLED EGGS	71.2
		L00202	GRILLED BACON	57.1
5	2	L08802	GRILLED FRANKFURTERS	62.7
		N04102	CHILI DOG	62.7
		Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
5	3	N01201	GRILLED CHEESEBURGER	62.7
		N01200	GRILLED HAMBURGER	62.7
		Q03801	REFRIED BEANS (CANNED REFRIED BEANS)	71.2
		W02024	TORTILLA CHIPS, 1 LB BAG	25
		L03400	TACOS	62.7
6	1	F00400	SOFT AND HARD COOKED EGGS	71.2
		F01000	SCRAMBLED EGGS	71.2
		L00202	GRILLED BACON	57.1
6	2	N01200	GRILLED HAMBURGER	62.7
		N01201	GRILLED CHEESEBURGER	62.7
		N04102	CHILI DOG	62.7
		Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
6	3	N01200	GRILLED HAMBURGER	62.7
		N01201	GRILLED CHEESEBURGER	62.7
		L08802	GRILLED FRANKFURTERS	62.7
		Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
7	1	F00400	SOFT AND HARD COOKED EGGS	71.2
		F01000	SCRAMBLED EGGS	71.2
		L00202	GRILLED BACON	57.1
7	2	N01200	GRILLED HAMBURGER	62.7
		L08802	GRILLED FRANKFURTERS	62.7
		Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2
		L03401	BURRITOS (BEEF & BEAN,FROZEN)	62.7
7	3	N01201	GRILLED CHEESEBURGER	62.7
		L08802	GRILLED FRANKFURTERS	62.7
		Q04501	FRENCH FRIED POTATOES (FROZEN)	71.2

MISCELLANEOUS ITEMS

DAY	MEAL	RECEIPE	ITEM NAME	SELECTION
		NUMBER		RATE
1	1	W00370	COCOA BEVERAGE POWDER, 1 OZ	64.6
		C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		CG0234	ORANGE JUICE	64.6
		W02715	CREAMER,NONDAIRY, 50/100 PG	25
		CG0211	APPLE JUICE,CND.,SINGLE STRENGTH	64.6
		W00251	BREAD, WHITE, SLICES	80
		D01300	BAGELS	80
		W00311	CEREAL,BRAN FLAKES, 70 SERVINGS	57.1
		W01925	SYRUP,IMITATION,MAPLE,# 10 CN	25
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00319	CEREAL,CORN,FLAKES,COATED,70 SERVINGS	57
		W02002	TEA,BLACK,100 BG	64.6
		W01323	MILK,APP (UHT) 1/2 PT OR 250 ML	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01003	JAM & JELLY, ASST, 1/2 OZ	25
		W00804	HONEY,1/2 OZ BOAT	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
1	2	C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00218	BEVERAGE BASE,ORANGE (NONCARBONATED)	64.6
		W00310	CATSUP,TOMATO, # 10 CN	25
		W01322	MILK,APP(UHT)LOWFAT,1/2 PT/250 ML	64.6
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W01921	SUGAR SUBSTITUTE, 3/4 - 1 GM	25
		W01916	SOY SAUCE, 16 OZ BT	25
		W01018	JELLY,GRAPE,2 LB DOMESTIC	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01336	MUSTARD SAUCE, 7/16 OZ BOAT	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
		W00254	BREAD, WHOLE, WHEAT	80
		W01805	RELISH,PICKLE,SWEET,# 10 CN	25
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
1	3	W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00207	BEVERAGE BASE,FRUIT PUNCH (NON CARB)	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25

DAY	MEAL	RECEIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W00310	CATSUP,TOMATO, # 10 CN	25
		W00809	HOT SAUCE,2-6 OZ	25
		W00355	CHEESE,GRATED,PARMESAN,1 LB	25
		W00602	FLAVORED MILK, CHOCOLATE	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01918	STEAK SAUCE,5 OR 10 OZ BT	25
		W00201	BARBECUE SAUCE, 7/16 OZ BOAT/CUP/BAG	25
		W01329	MILK, SKIM	64.6
		W00251	BREAD, WHITE, SLICES	80
		W02810	BEV BASE, ARTIFICIAL SWT FRUIT PUNCH	64.6
		W02716	CREAM,SOUR	49.6
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
2	1	W00370	COCOA BEVERAGE POWDER, 1 OZ	64.6
		C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		CG0234	ORANGE JUICE	64.6
		W02715	CREAMER,NONDAIRY, 50/100 PG	25
		CG0211	APPLE JUICE,CND.,SINGLE STRENGTH	64.6
		W00251	BREAD, WHITE, SLICES	80
		D01300	BAGELS	80
		W00311	CEREAL,BRAN FLAKES, 70 SERVINGS	57.1
		W01925	SYRUP,IMITATION,MAPLE,# 10 CN	25
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00319	CEREAL,CORN,FLAKES,COATED,70 SERVINGS	57
		W02002	TEA,BLACK,100 BG	64.6
		W01323	MILK,APP (UHT) 1/2 PT OR 250 ML	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01003	JAM & JELLY, ASST, 1/2 OZ	25
		W00804	HONEY,1/2 OZ BOAT	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
2	2	C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00218	BEVERAGE BASE,ORANGE (NONCARBONATED)	64.6
		W00310	CATSUP,TOMATO, # 10 CN	25
		W01322	MILK,APP(UHT)LOWFAT,1/2 PT/250 ML	64.6
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W01921	SUGAR SUBSTITUTE, 3/4 - 1 GM	25
		W01916	SOY SAUCE, 16 OZ BT	25
		W01018	JELLY,GRAPE,2 LB DOMESTIC	25

DAY	MEAL	RECEIPE NUMBER	ITEM NAME	SELECTION RATE
		W01908	SALT, TABLE, 5 LB BG	25
		W01336	MUSTARD SAUCE, 7/16 OZ BOAT	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
		W00254	BREAD, WHOLE, WHEAT	80
		W01805	RELISH, PICKLE, SWEET, # 10 CN	25
		C00902	TEA, INSTANT, LEMON W/ SUGAR, 24 OZ	64.6
2	3	W01612	PEPPER, BLACK, GROUND, 1 LB CN	25
		W00207	BEVERAGE BASE, FRUIT PUNCH (NON CARB)	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W00310	CATSUP, TOMATO, # 10 CN	25
		W00809	HOT SAUCE, 2-6 OZ	25
		W00355	CHEESE, GRATED, PARMESAN, 1 LB	25
		W00602	FLAVORED MILK, CHOCOLATE	64.6
		W01919	SUGAR, REFINED, 1/7 OZ	25
		W01918	STEAK SAUCE, 5 OR 10 OZ BT	25
		W00201	BARBECUE SAUCE, 7/16 OZ BOAT/CUP/BAG	25
		W01329	MILK, SKIM	64.6
		W00251	BREAD, WHITE, SLICES	80
		W02810	BEV BASE, ARTIFICIAL SWT FRUIT PUNCH	64.6
		W02716	CREAM, SOUR	49.6
		C00902	TEA, INSTANT, LEMON W/ SUGAR, 24 OZ	64.6
3	1	W00370	COCOA BEVERAGE POWDER, 1 OZ	64.6
		C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		CG0234	ORANGE JUICE	64.6
		W02715	CREAMER, NONDAIRY, 50/100 PG	25
		CG0211	APPLE JUICE, CND..SINGLE STRENGTH	64.6
		W00251	BREAD, WHITE, SLICES	80
		D01300	BAGELS	80
		W00311	CEREAL, BRAN FLAKES, 70 SERVINGS	57.1
		W01925	SYRUP, IMITATION, MAPLE, # 10 CN	25
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK, GROUND, 1 LB CN	25
		W00319	CEREAL, CORN, FLAKES, COATED, 70 SERVINGS	57
		W02002	TEA, BLACK, 100 BG	64.6
		W01323	MILK, APP (UHT) 1/2 PT OR 250 ML	64.6
		W01919	SUGAR, REFINED, 1/7 OZ	25
		W01003	JAM & JELLY, ASST, 1/2 OZ	25
		W00804	HONEY, 1/2 OZ BOAT	25
		W01908	SALT, TABLE, 5 LB BG	25
		W01324	MILK, APP (UHT) CHOC, 1/2 PT OR 250 ML	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
3	2	C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6

DAY	MEAL	RECEIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00218	BEVERAGE BASE,ORANGE (NONCARBONATED)	64.6
		W00310	CATSUP,TOMATO, # 10 CN	25
		W01322	MILK,APP(UHT)LOWFAT,1/2 PT/250 ML	64.6
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W01921	SUGAR SUBSTITUTE, 3/4 - 1 GM	25
		W01916	SOY SAUCE, 16 OZ BT	25
		W01018	JELLY,GRAPE,2 LB DOMESTIC	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01336	MUSTARD SAUCE, 7/16 OZ BOAT	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
		W00254	BREAD, WHOLE, WHEAT	80
		W01805	RELISH,PICKLE,SWEET,# 10 CN	25
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
3	3	W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00207	BEVERAGE BASE,FRUIT PUNCH (NON CARB)	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W00310	CATSUP,TOMATO, # 10 CN	25
		W00809	HOT SAUCE,2-6 OZ	25
		W00355	CHEESE,GRATED,PARMESAN,1 LB	25
		W00602	FLAVORED MILK, CHOCOLATE	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01918	STEAK SAUCE,5 OR 10 OZ BT	25
		W00201	BARBECUE SAUCE, 7/16 OZ BOAT/CUP/BAG	25
		W01329	MILK, SKIM	64.6
		W00251	BREAD, WHITE, SLICES	80
		W02810	BEV BASE, ARTIFICIAL SWT FRUIT PUNCH	64.6
		W02716	CREAM,SOUR	49.6
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
4	1	W00370	COCOA BEVERAGE POWDER, 1 OZ	64.6
		C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		CG0234	ORANGE JUICE	64.6
		W02715	CREAMER,NONDAIRY, 50/100 PG	25
		CG0211	APPLE JUICE,CND.,SINGLE STRENGTH	64.6
		W00251	BREAD, WHITE, SLICES	80
		D01300	BAGELS	80
		W00311	CEREAL,BRAN FLAKES, 70 SERVINGS	57.1
		W01925	SYRUP,IMITATION,MAPLE,# 10 CN	25
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00319	CEREAL,CORN,FLAKES,COATED,70 SERVINGS	57
		W02002	TEA,BLACK,100 BG	64.6

DAY	MEAL	RECEIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W01323	MILK,APP (UHT) 1/2 PT OR 250 ML	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01003	JAM & JELLY, ASST, 1/2 OZ	25
		W00804	HONEY,1/2 OZ BOAT	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
4	2	C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00218	BEVERAGE BASE,ORANGE (NONCARBONATED)	64.6
		W00310	CATSUP,TOMATO, # 10 CN	25
		W01322	MILK,APP(UHT)LOWFAT,1/2 PT/250 ML	64.6
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W01921	SUGAR SUBSTITUTE, 3/4 - 1 GM	25
		W01916	SOY SAUCE, 16 OZ BT	25
		W01018	JELLY,GRAPE,2 LB DOMESTIC	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01336	MUSTARD SAUCE, 7/16 OZ BOAT	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
		W00254	BREAD, WHOLE, WHEAT	80
		W01805	RELISH,PICKLE,SWEET,# 10 CN	25
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
4	3	W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00207	BEVERAGE BASE,FRUIT PUNCH (NON CARB)	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W00310	CATSUP,TOMATO, # 10 CN	25
		W00809	HOT SAUCE,2-6 OZ	25
		W00355	CHEESE,GRATED,PARMESAN,1 LB	25
		W00602	FLAVORED MILK, CHOCOLATE	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01918	STEAK SAUCE,5 OR 10 OZ BT	25
		W00201	BARBECUE SAUCE, 7/16 OZ BOAT/CUP/BAG	25
		W01329	MILK, SKIM	64.6
		W00251	BREAD, WHITE, SLICES	80
		W02810	BEV BASE, ARTIFICIAL SWT FRUIT PUNCH	64.6
		W02716	CREAM,SOUR	49.6
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
5	1	W00370	COCOA BEVERAGE POWDER, 1 OZ	64.6
		C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		CG0234	ORANGE JUICE	64.6
		W02715	CREAMER,NONDAIRY, 50/100 PG	25

DAY	MEAL	RECEIPE NUMBER	ITEM NAME	SELECTION RATE
		CG0211	APPLE JUICE,CND.,SINGLE STRENGTH	64.6
		W00251	BREAD, WHITE, SLICES	80
		D01300	BAGELS	80
		W00311	CEREAL,BRAN FLAKES, 70 SERVINGS	57.1
		W01925	SYRUP,IMITATION,MAPLE,# 10 CN	25
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00319	CEREAL,CORN,FLAKES,COATED,70 SERVINGS	57
		W02002	TEA,BLACK,100 BG	64.6
		W01323	MILK,APP (UHT) 1/2 PT OR 250 ML	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01003	JAM & JELLY, ASST, 1/2 OZ	25
		W00804	HONEY,1/2 OZ BOAT	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
5	2	C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00218	BEVERAGE BASE,ORANGE (NONCARBONATED)	64.6
		W00310	CATSUP,TOMATO, # 10 CN	25
		W01322	MILK,APP(UHT)LOWFAT,1/2 PT/250 ML	64.6
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W01921	SUGAR SUBSTITUTE, 3/4 - 1 GM	25
		W01916	SOY SAUCE, 16 OZ BT	25
		W01018	JELLY,GRAPE,2 LB DOMESTIC	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01336	MUSTARD SAUCE, 7/16 OZ BOAT	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
		W00254	BREAD, WHOLE, WHEAT	80
		W01805	RELISH,PICKLE,SWEET,# 10 CN	25
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
5	3	W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00207	BEVERAGE BASE,FRUIT PUNCH (NON CARB)	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W00310	CATSUP,TOMATO, # 10 CN	25
		W00809	HOT SAUCE,2-6 OZ	25
		W00355	CHEESE,GRATED,PARMESAN,1 LB	25
		W00602	FLAVORED MILK, CHOCOLATE	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01918	STEAK SAUCE,5 OR 10 OZ BT	25
		W00201	BARBECUE SAUCE, 7/16 OZ BOAT/CUP/BAG	25

DAY	MEAL	RECEIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W01329	MILK, SKIM	64.6
		W00251	BREAD, WHITE, SLICES	80
		W02810	BEV BASE, ARTIFICIAL SWT FRUIT PUNCH	64.6
		W02716	CREAM,SOUR	49.6
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
6	1	W00370	COCOA BEVERAGE POWDER, 1 OZ	64.6
		C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		CG0234	ORANGE JUICE	64.6
		W02715	CREAMER,NONDAIRY, 50/100 PG	25
		CG0211	APPLE JUICE,CND.,SINGLE STRENGTH	64.6
		W00251	BREAD, WHITE, SLICES	80
		D01300	BAGELS	80
		W00311	CEREAL,BRAN FLAKES, 70 SERVINGS	57.1
		W01925	SYRUP,IMITATION,MAPLE,# 10 CN	25
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00319	CEREAL,CORN,FLAKES,COATED,70 SERVINGS	57
		W02002	TEA,BLACK,100 BG	64.6
		W01323	MILK,APP (UHT) 1/2 PT OR 250 ML	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01003	JAM & JELLY, ASST, 1/2 OZ	25
		W00804	HONEY,1/2 OZ BOAT	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
6	2	C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00218	BEVERAGE BASE,ORANGE (NONCARBONATED)	64.6
		W00310	CATSUP,TOMATO, # 10 CN	25
		W01322	MILK,APP(UHT)LOWFAT,1/2 PT/250 ML	64.6
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W01921	SUGAR SUBSTITUTE, 3/4 - 1 GM	25
		W01916	SOY SAUCE, 16 OZ BT	25
		W01018	JELLY,GRAPE,2 LB DOMESTIC	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01336	MUSTARD SAUCE, 7/16 OZ BOAT	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
		W00254	BREAD, WHOLE, WHEAT	80
		W01805	RELISH,PICKLE,SWEET,# 10 CN	25
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
6	3	W01612	PEPPER, BLACK.GROUND, 1 LB CN	25

DAY	MEAL	RECEIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W00207	BEVERAGE BASE,FRUIT PUNCH (NON CARB)	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W00310	CATSUP,TOMATO, # 10 CN	25
		W00809	HOT SAUCE,2-6 OZ	25
		W00355	CHEESE,GRATED,PARMESAN,1 LB	25
		W00602	FLAVORED MILK, CHOCOLATE	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01918	STEAK SAUCE,5 OR 10 OZ BT	25
		W00201	BARBECUE SAUCE, 7/16 OZ BOAT/CUP/BAG	25
		W01329	MILK, SKIM	64.6
		W00251	BREAD, WHITE, SLICES	80
		W02810	BEV BASE, ARTIFICIAL SWT FRUIT PUNCH	64.6
		W02716	CREAM,SOUR	49.6
		C00902	TEA,INSTANT,LEMON W/ SUGAR,24 OZ	64.6
7	1	W00370	COCOA BEVERAGE POWDER, 1 OZ	64.6
		C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		CG0234	ORANGE JUICE	64.6
		W02715	CREAMER,NONDAIRY, 50/100 PG	25
		CG0211	APPLE JUICE,CND.,SINGLE STRENGTH	64.6
		W00251	BREAD, WHITE, SLICES	80
		D01300	BAGELS	80
		W00311	CEREAL,BRAN FLAKES, 70 SERVINGS	57.1
		W01925	SYRUP,IMITATION,MAPLE,# 10 CN	25
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00319	CEREAL,CORN,FLAKES,COATED,70 SERVINGS	57
		W02002	TEA,BLACK,100 BG	64.6
		W01323	MILK,APP (UHT) 1/2 PT OR 250 ML	64.6
		W01919	SUGAR,REFINED, 1/7 OZ	25
		W01003	JAM & JELLY, ASST, 1/2 OZ	25
		W00804	HONEY,1/2 OZ BOAT	25
		W01908	SALT,TABLE, 5 LB BG	25
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
7	2	C00500	COFFEE(AUTOMATIC URN) PLAIN	64.6
		W02801	MARGARINE, 90 PATTIES	25
		W01612	PEPPER, BLACK,GROUND, 1 LB CN	25
		W00218	BEVERAGE BASE,ORANGE (NONCARBONATED)	64.6
		W00310	CATSUP,TOMATO, # 10 CN	25
		W01322	MILK,APP(UHT)LOWFAT,1/2 PT/250 ML	64.6
		W01324	MILK, APP (UHT) CHOC,1/2 PT OR 250 ML	64.6
		W01921	SUGAR SUBSTITUTE, 3/4 - 1 GM	25

DAY	MEAL	RECEIPE	ITEM NAME	SELECTION
		NUMBER		RATE
		W01916	SOY SAUCE, 16 OZ BT	25
		W01018	JELLY, GRAPE, 2 LB DOMESTIC	25
		W01908	SALT, TABLE, 5 LB BG	25
		W01336	MUSTARD SAUCE, 7/16 OZ BOAT	25
		W01605	PEANUT BUTTER, SMOOTH, 28 OZ JR	25
		W00254	BREAD, WHOLE, WHEAT	80
		W01805	RELISH, PICKLE, SWEET, # 10 CN	25
		C00902	TEA, INSTANT, LEMON W/ SUGAR, 24 OZ	64.6
7	3	W01612	PEPPER, BLACK, GROUND, 1 LB CN	25
		W00207	BEVERAGE BASE, FRUIT PUNCH (NON CARB)	64.6
		W00258	BUTTER, 90 PATTIES, READY TO SERVE	25
		W00310	CATSUP, TOMATO, # 10 CN	25
		W00809	HOT SAUCE, 2-6 OZ	25
		W00355	CHEESE, GRATED, PARMESAN, 1 LB	25
		W00602	FLAVORED MILK, CHOCOLATE	64.6
		W01919	SUGAR, REFINED, 1/7 OZ	25
		W01918	STEAK SAUCE, 5 OR 10 OZ BT	25
		W00201	BARBECUE SAUCE, 7/16 OZ BOAT/CUP/BAG	25
		W01329	MILK, SKIM	64.6
		W00251	BREAD, WHITE, SLICES	80
		W02810	BEV BASE, ARTIFICIAL SWT FRUIT PUNCH	64.6
		W02716	CREAM, SOUR	49.6
		C00902	TEA, INSTANT, LEMON W/ SUGAR, 24 OZ	64.6

APPENDIX D
MATHEMATICAL SPECIFICATIONS OF THE
OPTIMIZATION MODEL

Appendix D - Mathematical Specifications of the Optimization Model

1. Model Definition

The Convenience Food Logistics Model uses an A-ration food menu and substitution rates for “generic” category types (e.g., breakfast foods, side dishes, main dishes, dessert, etc.) to create an optimal substituted combination menu (including both A-ration and convenience items) for a given objective function.

For a given environment of a ship, the number of portions to be prepared for each menu item can be determined exogenously. Some of the environmental variables which could affect the number of portions to be prepared per menu item are:

- Ship's complement
- Number of enlisted, chiefs and officers level staff
- Attendance patterns
- User preferences and selection rates
- Weather conditions
- Geographical location of the ship
- Peace-time vs. war-time deployment

At present, the model only incorporates the first four variables. Additional variables, such as those mentioned herein, may be added to the model in the future as specified. The CFLM uses an optimization algorithm to generate the combination menu, which is used to evaluate the impact of convenience food substitution on cost, labor hours, storage, and equipment. In particular, the optimization algorithm takes the user specified menu file as input and substitutes some of the menu items with convenience food substitutes in order to achieve the user-specified substitution percentages for various recipe categories.

For a given ship environment, the number of portions needed for each menu item in each meal can be determined exogenously and can be considered constants. The number of portions to be cooked is primarily dependent on the personnel authorized to subsist from the general mess on the ship. However, not all meals are attended by all authorized personnel. Hence, one should also account for attendance patterns (dinner vs. breakfast and weekday vs. weekend) in computing the portions needed. In addition, even though a customer attends a particular meal, he may not select all items available on the menu for that meal. The factors which represent what percentage of attending customers select a particular menu item are referred to as Selection Rates. Currently, the CFLM uses complement size, attendance, and selection rates to compute portion amounts. However, other variables can be added to the model in the future as the optimization algorithm is not impacted by the complexity of the computations used to determine the number of portions needed.

For developing a mathematical formulation of the optimization problem, let us assume that we are modeling a menu D days long, each day having a maximum of M meals. (Navy menus are 35 days long with three or four meals a day; meals generally contain 7-10 menu items.) Let N be the maximum number of menu items in a meal over all meals of a menu. Then, we can define a menu as an ordered list of items $ITEM(d,m,n)$ where,

$$\begin{aligned} d &= 1, 2, 3 \dots D, \\ m &= 1, 2, 3 \dots M \text{ and} \\ n &= 1, 2, 3 \dots N. \end{aligned}$$

Let us define $PORTIONS(d,m,n)$ as the number of Portions of $ITEM(d,m,n)$ needed to be prepared for a given environment the user wants to simulate. In general, $PORTIONS(d,m,n)$ could be an arbitrarily complex function P of environmental variables, i.e.,

$$PORTIONS(d,m,n) = P(ITEM(d,m,n), \text{Customers}, \text{Attend}, \text{Selection}, \dots, \text{etc.}).$$

Here, Customers are the number of patrons to be served from the mess, Attend is a variable specifying attendance rate and Selection is a variable specifying selection rate for a menu item. As stated previously, $PORTIONS(d,m,n)$ are assumed to be constants for the convenience food optimization algorithm; the function P can be arbitrarily complex and can be calculated exogenously. This means that any future revisions to specify a more complex function P will have minimal impacts on the optimization algorithm itself. Currently, the CFLM uses the following function:

$$\begin{aligned} PORTIONS(d,m,n) &= \text{Customers served from General mess} * \text{Attendance} (d,m) \\ &\quad * \text{Selection} (d,m,n). \end{aligned}$$

1.1 Decision Variables

Decision variables for the convenience food substitution problem are logical in nature (whether to substitute an $ITEM(d,m,n)$ by its convenience food substitute). Define $X(d,m,n)$ as a zero-one integer variable with zero meaning that the $ITEM(d,m,n)$ is not substituted by its convenience food substitute and one meaning $ITEM(d,m,n)$ is substituted by its convenience food substitute. Assume that only one convenience food substitute exists for each A-ration item. However, under the model's constraints for the problem, if more than one convenience food substitute exists for a given menu item, it is only necessary to pick the one which is best in terms of the objective function being modeled (e.g., if modeling for minimizing costs, consider only the least costly convenience food substitute). If modeling a typical 35 day, 3 meal menu with an average of 8 menu items per meal, the optimization problem will have $35*3*8 = 840$ variables. If there is more than one convenience food substitute for A-ration items and the assumption of using the best substitute is not valid, then the number of variables in the optimization problem

increases substantially.

1.2 Objective Function

The objective functions a user may choose to model are food cost, labor hours, freezer storage, chilled storage, and dry storage. A user may also optimize based on a weighted objective function generated by weighting two or more of these objectives. If the objective function value for the 100% A-ration menu is assumed as the base, it is also possible to minimize the difference between the objective function values for both the substituted and the A-ration menu without loss of generality. As an example, consider minimizing labor hours as the objective function.

Let $L_{d,m,n}$ be the difference between the labor hours needed to prepare a required number of convenience food substitute portions and the labor hours needed to prepare the same number of portions using A-ration items ITEM(d,m,n). The minimizing labor hour objective function can be written as follows:

$$\text{Minimize } \sum L_{d,m,n} X_{d,m,n}$$

where,

$$L_{d,m,n} = l_c(\text{PORTIONS}(d,m,n)) - l_a(\text{PORTIONS}(d,m,n)).$$

Notice that $l_c(.)$ and $l_a(.)$ can be arbitrarily complex as $L_{d,m,n}$ is exogenously calculated and is assumed a constant for the optimization problem.

Cost and dry, chilled, and freezer storage can be similarly defined as objectives. Let the objective function coefficients associated with cost, dry storage, chilled storage, and freezer storage be $C_{d,m,n}$, $DS_{d,m,n}$, $CS_{d,m,n}$, and $FS_{d,m,n}$, respectively. The weighted objective function is obtained by weighting these objectives. If user-specified weights of W_c , W_l , W_{ds} , W_{cs} and W_{fs} are assumed for the cost, labor, dry storage, chilled storage, and freezer storage respectively, coefficients for the weighted objective function can be defined as:

$$W_{d,m,n} = W_c * C_{d,m,n} + W_l * L_{d,m,n} + W_{ds} * DS_{d,m,n} + W_{cs} * CS_{d,m,n} + W_{fs} * FS_{d,m,n}.$$

It should be noted here that the convenience food substitute used in these computations is the best with respect to the objective function under consideration. If a user selects cost minimization as the objective, the model will use the least costly convenience food substitute. Similarly, if a weighted objective is minimized, one would compute the weighted coefficient for each substitute and pick the one which yields the least coefficient value.

1.3 Constraints

The CFLM is designed to allow for substitution rate constraints. These constraints are modeled to ensure that user-specified substitution rates are achieved for each category. The user input substitution rate for each “generic” category is modeled as a constraint. Assume that all items are a single “generic” category, all days have the same number of meals M , and all meals have the same number of menu items N . In this scenario, a user may compute the total number of convenience items needed in the output menu as $C = D * M * N * \text{Sub_rate}$. If, however, all days do not have the same number of meals and/or all meals do not have the same number of menu items, compute $C = (\text{Total No. of Menu Items on the Menu}) * \text{Sub_rate}$. If this expression is not an integer, use the nearest whole number. The constraint for this single category problem is, thus, written as,

$$\sum X_{d,m,n} = C.$$

If there are G “generic” categories to be modeled, substitution rate constraints are needed for each of these categories. Let $\text{CAT}(g)$ be the set of all menu items in “generic” category $g = 1, 2, \dots G$. Then, the G -category problem will have the following substitution rate constraints.

$$\sum X_{i \in \text{CAT}(1)} = C(1),$$

$$\sum X_{i \in \text{CAT}(2)} = C(2) \text{ and}$$

$$\sum X_{i \in \text{CAT}(G)} = C(G).$$

$C(1), C(2), \dots C(G)$ are calculated in a manner analogous to C above.

There are other constraints which may be useful in future applications of this model (e.g., designing menus). While these are not modeled in this initial version of the model, a brief description of these constraints is provided in Section 2.3.

2. Optimization Algorithm

The optimization problem specified in the last subsection can be decomposed into smaller category specific problems. For example, the labor hour minimization problem can be calculated by solving G individual category specific problems of the form:

$$\text{Minimize } \sum_{i \in \text{CAT}(g)} L_i X_i$$

$$\text{subject to } \sum X_{i \in \text{CAT}(g)} = C(g),$$

$$X_i = 0 \text{ or } 1.$$

$$\text{for } g = 1, 2, 3, \dots G.$$

This decomposition is possible because there are no constraints linking "generic" categories of menu items. The category-specific problem is similar to a zero-one knapsack problem. A simple algorithm for solving this problem is now described.

Step 1: A list of menu items in each "generic" category is developed.

Step 2: The total number of menu items falling into each category is counted. The total number of menu items is multiplied by the substitution rate and rounded to the nearest whole number to arrive at the number, $C(g)$, of menu items to be substituted by convenience foods for each category g .

Step 3: A list of convenience food substitutes in each category is developed for each menu item. If the list of convenience food substitutes is less than $C(g)$, the number of menu items in any category g to be substituted, the problem is infeasible. The user is informed to reduce the substitution rate for that category and rerun the optimization.

Step 4: If the problem is feasible for all categories then the objective function coefficients for each menu item in each category is computed. The best substitute for the objective function under consideration is used to compute the objective function coefficients. For example, the convenience food item which yields the least labor hours for preparing the required portions of the menu item would be used, if minimizing labor hours was the objective. As described previously, the objective function coefficients are the difference between the labor hours needed to prepare the convenience food substitute and the labor hours needed to prepare the equivalent Navy recipe item. For the weighted objective function, coefficients for the five different objectives are calculated and weighted by applying the user-input values.

Step 5: The items are sorted in ascending order of objective function coefficients for each category. The first $C(g)$ items in this sorted list are selected for each category g . These items would be substituted by convenience foods.

Step 6: The optimal substituted menu is constructed by replacing the items selected for substitution with their convenience food substitutes.

Step 7: The cost, labor hours, storage, and equipment requirements for both the optimal substituted menu and the original Navy recipe menu are computed and displayed for comparison.

A flowchart depicting the algorithm logic is presented in Figure D-1.

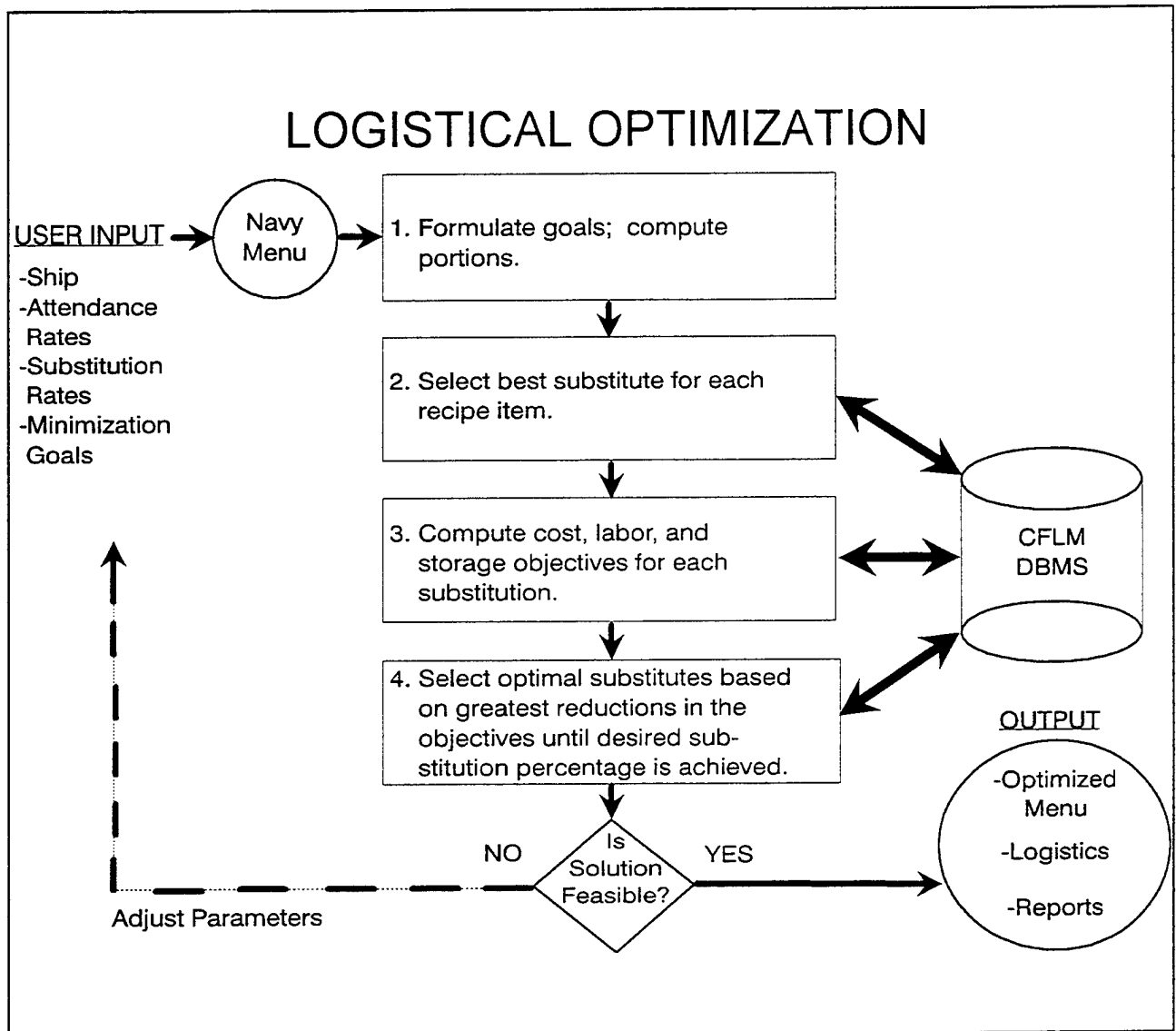


Figure D-1 - Logistical Optimization Process

2.1 Substitution Table

Underlying the optimization algorithm is the existence of a substitution table that specifies which convenience food items are potential substitutes for a given AFRS recipe item. Currently, the CFLM generates a substitution list on the basis of two categorizations of the Navy recipe and convenience food items, namely the recipe category and the product type. The convenience food products which are similar to the AFRS recipe item under consideration, in terms of both categorizations, are considered possible substitutes.

The optimization model described assumes that if an item is substituted by a convenience food product, it replaces all portions of the relevant AFRS recipe item. In other words, partial substitutions of recipe items by their convenience food substitutes are not considered. Allowing partial substitutions would imply that customers have a choice between the AFRS recipe item and its substitute. Intuitively, this additional choice would increase service time as well as diminish the Navy's ability to achieve full economies of scale in food preparation and procurement. Also, food quality is assumed to be similar for AFRS recipe items and their convenience food substitutes. This assumption is significant as the same selection and attendance rates are presumed for both the Navy recipe item and its substitute. Therefore, the same number of portions is used when calculating the food cost, labor hour, storage, and equipment requirements for a substituted menu and the AFRS menu.

2.2 Multiple Objectives/Weights

As described in the previous section, the CFLM has the capability of treating multiple objectives by weighting the basic objectives of labor, food cost, dry, chilled, and freezer storage requirements. Consider a weighted objective function $w_1 * f_1(.) + w_2 * f_2(.)$ obtained by weighting two base objective functions of $f_1(.)$ and $f_2(.)$. From the optimization standpoint, it is the relative weight (i.e., w_2/w_1) which determines the solution. If w_2/w_1 is zero then the solution obtained would be the one obtained by optimizing based on function f_1 alone. On the other hand, if w_2/w_1 is infinite, the solution would be one based on optimizing for f_2 alone. As w_2/w_1 varies from zero to infinite, the model solution will span all Pareto optimal solutions to the multi-objective optimization problem. Currently, the user of the CFLM decides weights by selecting importance for each objective on a scale of 0 to 10. This is relatively simple for users to understand; however, this type of weighting introduces a problem because the objectives are in different units and the magnitudes of the objectives are vastly different. For example, a user who enters weights of 10 and 10 for both freezer storage and cost places equal importance on both objectives. However, the typical food cost for a 35-day menu cycle (not including standard menu items such as the salad bar, speedline or miscellaneous items) is in the \$200,000 to \$300,000 range while the freezer storage requirements are in the 2,000 to 3,000 cubic feet range. Thus, if one were to set both W_c and W_{FS} to user input weights of 10, the optimization model will assign most of the importance to food costs as they are approximately one hundred times greater than freezer storage requirements for a typical menu. To alleviate this problem,

scaling factors were generated to scale user input weights to weights used in the optimization problem. These factors represent relative magnitudes of the five objectives (food cost, labor, dry, chilled and freezer storage) in the units in which the CFLM performs its computations. The factors were derived by computing logistical parameters for several typical Navy menus and obtaining average food costs, labor minutes, dry, chilled, and freezer storage requirements in cubic feet. These scaling factors are 89, 71, 2.2, 1.0 and 1.09 for food costs, labor minutes, dry storage, chilled storage and freezer storage, respectively. One can interpret these factors in the following way: in a typical Navy menu, for each cubic foot of chilled space requirement, one needs approximately 2.2 and 1.09 cubic feet of dry and freezer storage requirements, respectively; a menu requiring 1 cubic foot of chilled storage would need approximately 89 dollars in food costs and 71 minutes of preparation time.

Since the software is modular in design, future enhancements that specify more complex functions P may be easily made.

2.3 Other Constraints

For future uses of the model (e.g., designing menus or developing strategies for food service operations), the user will be working with an existing ship and hence a maximum amount of dry, chilled, or freezer storage and equipment available. In such situations, it may be best to model storage and equipment as constraints. However, adding these constraints complicates the algorithm described previously and thus, the initial version of the CFLM does not attempt to model these constraints.

2.3.1 Equipment Constraints

Equipment available on an existing ship may act as a constraint for preparing each meal. It is possible to have constraints for all major types of equipment. The CFLM databases allow for five different equipment types (Ovens, Steam Kettles, Fryers, Griddles, and Mixers). For each equipment type modeled, the number of constraints increases by the number of meals modeled. Thus, for a 35 day, 3 meal menu, one would add 105 constraints for each equipment type to the optimization problem. Also, the decomposition of the problem into smaller category specific problems is no longer valid as there are constraints linking various "generic" categories. The assumption of using the best convenience food substitute to compute the objective function coefficients is also no longer valid as a particular variable X_i may appear in one substitution rate constraint as well as several equipment constraints. Thus, general Integer Programming software is needed to model the problem with equipment constraints.

2.3.2 Storage Constraints

When designing menus, the user may model maximum amounts of dry, chilled, and freezer storage on existing ships as constraints. If various types of storage are modeled as constraints, add three constraints (one each for dry, chilled, and freezer storage) to the formulation described in the previous subsection. The decomposition into category-specific problems is no longer valid and the assumption of using the best convenience food substitute in the situation when more than one substitute for a particular menu item exist is also no longer valid. This increases the number of variables in the optimization problem significantly. In any event as described in the next paragraph, the provision of simulating a weighted objective function reduces the need to model storage as a constraint explicitly. In the following discussion, for ease of reference, we will refer to optimization problem formulations by Roman numerals. The initial statement of the optimization problems will note the Roman numerals to their right.

The theory of Lagrange Multipliers states that any problem of the form

$$\begin{array}{ll} \text{Min} & f(x) \\ \text{s. to} & g(x) \leq b \\ & x \text{ in } X \end{array} \quad (\text{I})$$

is equivalent to its Lagrangian Dual,

$$\begin{array}{ll} \text{Max}\{\text{Min}\{f(x)+u g(x)\} - ub\} & (\text{II}) \\ u \geq 0, & x \text{ in } X \end{array}$$

In other words, there exists a u (weighting factor) greater than zero where problem (II) has the same optimal solution x^* as problem (I). Thus, giving the user an option to weight the objective functions, allows for the modeling of various types of storage as constraints. To be more specific, add storage constraints to the problem of labor hour minimization. The problem formulation is the following:

$$\begin{array}{ll} \text{Min} & \sum L_{d,m,n} X_{d,m,n} \\ \text{s. to} & \sum DS_{d,m,n} X_{d,m,n} \leq \text{MDS} \\ & \sum CS_{d,m,n} X_{d,m,n} \leq \text{MCS} \\ & \sum FS_{d,m,n} X_{d,m,n} \leq \text{MFS} \\ & x \text{ in } X. \end{array} \quad (\text{III})$$

Here, MDS, MCS, and MFS are maximum dry storage, maximum chilled storage, and maximum freezer storage available, respectively on the ship being modeled. Also, X includes 0-1 integer constraints and substitution rate constraints. If a user solves the labor

hour minimization problem without the storage constraints and the optimal solution did not violate any of the three storage constraints, then the optimal solution to the storage constrained problem (III) has been obtained. If, however, one or more of the storage constraints are violated, the user will create a weighted objective function with positive weights for the storage constraints. This new problem will be of the form

$$\begin{aligned} \text{Min } & \sum L_{d,m,n} X_{d,m,n} + W_{ds} * \sum DS_{d,m,n} X_{d,m,n} + W_{cs} * \sum CS_{d,m,n} X_{d,m,n} \\ & + W_{fs} * \sum FS_{d,m,n} X_{d,m,n} \\ \text{s. to } & x \text{ in } X. \end{aligned}$$

As the weights, W_{ds} , W_{cs} and W_{fs} are increased, the user will eventually reach an optimal solution that does not violate the storage constraints.

BIBLIOGRAPHY

1. CAMPBELL SOUP COMPANY, PRICE LIST FOR CAMPBELLS PRODUCTS, CAMDEN, NJ, (EFFECTIVE DATE: JUNE 17, 1994).
2. CONAGRA FROZEN FOODS, FOOD SERVICE DIVISION, PRICE LIST FOR CONAGRA PRODUCTS (INCLUDING: HEALTHY CHOICE, ARMOUR, AWARD, CHUN KING, MORTON, AND BANQUET), OMAHA, NEBRASKA, (EFFECTIVE DATE: DECEMBER 13, 1993).
3. KARP'S MANUFACTURED PRODUCTS DIVISION, PRICE LIST FOR KARP'S FROZEN PASTRY PRODUCTS, GEORGETOWN, MA, (EFFECTIVE DATE: JULY 1994).
4. NESTLE BRANDS FOODSERVICE COMPANY, FROZEN FOODS DIVISION, PRICE LIST FOR STOFFER'S PRODUCTS, SOLON, OH 44139, (EFFECTIVE DATE: SEPTEMBER 6, 1994).
5. OREIDA FOODS, INC., FOODSERVICE PRICE LIST -EASTERN, BOISE, ID, (EFFECTIVE DATE: MARCH 28, 1994).
6. PILLSBURY FOODS, INC., PILLSBURY FROZEN BAKERY FOODS PRICE LIST, MINNEAPOLIS, MN, (EFFECTIVE DATE: APRIL 11, 1994).
7. READI-BAKE, INC., PRICE LIST FOR READI-BAKE NATIONAL PRICE LIST, GRAND RAPIDS, MI, (EFFECTIVE DATE: AUGUST 21, 1994).
8. RICHARDSON & PETKOVSEK, INC., PRICE LIST FOR RICH'S PRODUCTS, OWINGS MILLS, MD, (EFFECTIVE DATE: NOVEMBER 14, 1994).
9. SARA LEE BAKERY FOOD SERVICE, PRICE LIST FOR SARA LEE BAKERY PRODUCTS, CHICAGO, IL, (EFFECTIVE DATE: JANUARY 4, 1993).
10. DEPARTMENT OF THE NAVY, NAVAL SEA SYSTEMS COMMAND, GENERAL SPECIFICATIONS FOR SHIPS OF THE UNITED STATES NAVY, ARLINGTON, VA, 1994.
11. MACDONALD'S AND JANE'S PUBLISHERS LIMITED, JANE'S FIGHTING SHIPS, 96TH EDITION, LONDON, ENGLAND, 1994.
12. SAKAWA, MASATOSHI, FUZZY SETS AND INTERACTIVE MULTI-OBJECTIVE OPTIMIZATION, PLENUM PRESS, NY (1993).
13. US ARMY NATICK, CONVENIENCE FOOD STUDY, N95-14 NAVY FOOD SERVICE 2000 - TASK 1 (CONVENIENCE FOODS MODEL), NATICK, MA, 1994.
14. U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, DC, ARMED FORCES RECIPE SERVICE, US ARMY TM-10-412, REVISION, SEPTEMBER 1992.
15. U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, DC, FOOD SERVICE OPERATIONS, NAVSUP PUBLICATION 421, JANUARY 1994 EDITION.